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### LYON'S

# MEDICAL JURISPRUDENCE FOR INDIA,

WITH ILLUSTRATIVE CASES.

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It Oxford INS (Feld.), Extrafell ref Chemistry Calcults Vertical College
Chemical Extraorer to Overnments of Rengal and India and
Examiner in M.C. and Justipullence, Calculpt Internit.

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## PREFACE TO THE SEVENTH EDITION.

In response to the demand for a further edition of this work, the Seventh,—a demand which is gratifying alike to the joint-author and the publishers, as attesting the felt want which the work fills as a standard text-book—opportunity has been taken to revise the text and to add fresh matter and illustrative cases wherever found necessary, to bring it up to date. The chapter on Blood-Stains has been revised by Colonel Sutherland, and

further statistical evidence supplied of the practical value of his method for the detection of human blood. It is hoped that these additions will enhance the usefulness of the book alike to Civil Surgeons, Medical Practitioners and

Students the Beuch and the Bar in India

I A WADDELL

LONDON Wareh 1921

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#### INTRODUCTORY

#### MEDICAL RELATIONS WITH THE LAW COURTS.

As a hunter tracks a wounded brast to its lair by its drops of blood, so let a hing track [crime] to justice by close searched proofs' — Manus Line Code (about 100 BC)

MEDICAL Jurisprudence may be defined as the science which terches us how to discover and apply medical and cognities scientific facts for the ends of Law and Justice, in unravelling Crime and protecting Individuals, Society and the State. It is an application of Medicial Knowledge from a very different standpoint from Medicine proper, and represents all the difference between seeing by the eye of the Law, instead of by the eye of the Healing Art. Thus a wound which the surgeon is concerned only to so examine and treat as to heal it as quickly as possible, requires the medical jurist to note. 'Is it dangerous to life'? 'How and with what weapon was it inflicted?'? 'Was it accidental, self-inflicted, suicidal or homoidal'? 'Was it inflicted before or after death'? etc, etc, etc. And in a case of cutthroat, whilst his first object is to savo the patients hife, he requires to note many necessary details for the law-courts.

The early use of incdical knowledge for legal purposes can be traced in the ancient codes. Manui forbade corporal punishment of a pregnant woman, the Mosue Law, which is now found to have been borrowed by the Jews from the Baby loning Code of Khammurah (2123-2081 Br.) and previous Aryan lawgivers, required the priests to adduce medical evidence in wounds, leprosy, etc., the Greek forensics, such as Galen, discussed questions of legitimacy, simulated diseases, the differences between the lungs of the live-born and the foctus, and for India there are similar references in the later Vedas, in Manu's code and the Purman's In Vedic Interature (crical code).

650-100 BC) abortion or 'the slaying of an embryo' (bhruna

hat m) was a specified crime 1

It was not, however until the 16th century a D that a definite status was accorded to medical evidence in Europian courts of law. The pinal code of George Bishop of Bainberg in Germany, drawn up in 1507, is considered the first effort in this direction, and a quarter of a century liter this was enlarged and extended to the berman empire by the Diet of the neighbouring town of Ratisbon. In 1553 Charles V promulgated the code bearing his name—Constitute Cramaius Carolina—which has been called

the dawn of legal medicine. In it the magistrate is directed to obtain the opinion of medical men in criminal trials where death was allered to have occurred from criminal causes

This new department of study was known as State Medicine in Bermany and as Logal Medicine in France, and when it was laterly introduced into Great Britain it was called Medicial Jurisprudence or Forensic Medicine. The first systematic treatise on the subject in English appeared in 1787, in Dr. Parr \* Thements of Medical Jurisprudence and in 1801 the first chair for the teaching of the subject was established in Britain, that of Dr. Duncan at Ldinburch.

Whilst the edifice of the new study was reard on the Furgoan continent, largely by the systematic labours of Orfila the Sprimard, of Tardeu in Paris and of Casper in Berlin, before the year 1850 the classics of Christison of Linhburgh, and Taylor and Guy of London had redeemed the reputation of the British school, and soon thereafter India possessed Norman Chevers pioneer manual At the present das the importance of this subject is so well recognized that its study forms an essential part of the medical course of every university and licensing body in the United Kingdom So also is in India for expert medical testimony, important in every country, is especially so in the East, where it is often the only trustworthy evidence on which hangs the liberty or the life of a human being

In this way, the Law, in the interests of good government, often required medical men to assist it in laying bare the evidence of many kinds of erime and loft-nices against the person and civil rights of individuals and the community at large, such as assault murder, poisoning rape legitimace, inheritance, divorce, insanity, fraudulent impersonation, questions of dama\_es for injuries, like assurince, etc. Thus the medical

<sup>1</sup> Vedic Index Macdonell and Keith 1912 I 301

<sup>\*</sup> Forensic is derived from the Latin forum the market-place, because the Romans whose law code still remains to-day the basis of our own, held their court of pastice there.

practitioner is liable to be called on at any time to give evidence as a medical jurist in the witness-box, in cases of more or less public interest or notoricty, so it behoves him even for his own reputation that he should learn to look from the medico legal strindpoint upon all his cases which are likely to become the subject of judicial judicity, and that he should curefully note down at the time everything likely to be of medico-legal importance.

It is also desirable that he should know something of the legal nature of evidence and the procedure in courts of law, and in the case of the medical jurist in India, the procedure in Indian law courts in particular, some of the peculiurities of crime in India, the circumstances under which the more common crimes come to be perpetrated, and the devices ordinarily taken to conceal crime in this country

#### Criminal Procedure and Medical Evidence in India.

The present law of India is based upon English and Roman law modified to suit the varying customs and religious beliefs of the Hindu, Mohammedan and other different nationalities which make up the great Indian continent

The preliminary inquiry into offences against the person and into sudden and unnatural deaths in India is made by a police officer, who is authorized in Ital cases to forward the dead body for examination to the nearest envil surgeon or other qualified medical man appointed by the Local Government conduct such examinations, except in Calcutta and in Pombay city, where the coroner makes an inquest and arranges for the most such examination. District, sub divisional, and other might rates specially impowered by the Local Government or by the district magistrate, may also hold inquests and order the exhumation of a body for examination?

The medical officer's report is sent to the magistrate of the district (or his sub-divisional magistrate), who, in crass where a reasonable suspicion is established against an accused person in the case, may require the presence of the reporting medical officer to give a diposition at his court in presence of the accused and be cross examined if necessary. For the medical report cannot be admitted as oxidence until it has been deposed to and recorded de note by the magistrate in presence of recused

<sup>&</sup>lt;sup>1</sup> Griminal Procedure Code s 174 (1) In Bombay and Madras Presidences the inquiry into unnatural deaths may be made by the village headman (s 174 (4))
<sup>1</sup> Or I C ss 174 (5), 176

#### 4 MEDICAL RELATIONS WITH LAW COURTS

At this mainstrite's court the medical efficer should give he vidence with a much circ is he would do in the High Court, for his vidence is recorded and the case may go to the higher court however trivial it may seem, in which case the opposing comised with the evidence in the lower court lad before him and with weeks to pick holes in any loose expressions that he may have used, and prompted by a clever medical man at his elbow, may bring the medical evidence into disgredit. On the other hind if the medical report does not sublantiate the clarge; the case is not usually proceeded with further, for the medical officer evercises practically the judicial function of a 'Court of I irst Instance' in a seault cases

Should it prove to be one of the more grave offences, such as murder causing miscarriage, ripe etc., which are triable only by Courts of Session or High Courts the distinct magnitative (or his sub-divisional magnitate) after recording the evidence commits the accused for trial to the higher court. Thus the medical man who conducted the original examination may be required to appear before more than one court in connection with the same case should the mainstrate deem it necessary 1

The several criminal courts are (a) High Courts, (b) Courts of Session, (c) Magistrates of the 1st class and Presidency Magistrates of the 2nd and 3rd class

The powers of these courts as —The High Courts and Courts of Session are empowered to try any offices and to pass any sentence authorized by law but a sentence of death passed by a Court of Session I shall be subject to confirmation by the High Court (s 13) Courts of presidency magnitudes and of magnitudes of the first class may not try cartain grace officence, e.g. mayder, causing macarriage, rape and unnatural officences, and may not for any single officence sentence to more than two years impressement and 1000 repress fine. Magnetizates of the second class may not try any officence quantification with three years impressement and 1000 repression for the entire to more than two years are presented to the control of the proposed of the second class may not try any officence punishable with one year a impressement for more than one month and may not for any single officence sentence to impressoment for more than one month and 50 rupees fine. Third class may sustrate may not sentence to solitary confinement or to whipping, and second class.

 $^1$  Cr F C., a 500 (1) states that it the civil surgeons sendence is taken before the committing magnituste and divised by him that is to say, the committing magnituste must state below the civil surgeons a deposition that it was when in presence of accessed and explanate to bins and finit he had an opportunity of cross exam nation the higher court may accept it as evidence without calling the civil surgeon. Chance 2 however empowers the higher crurt to cill him but that is not insufity done with provincial cases unless the standance of a nethest witness cannot be obtained by all So where the standance of a melicular viluous cannot be obtained by all the standance of a melicular viluous cannot be obtained by all the standance of a melicular viluous cannot be obtained as the trait [509]

magistrates may only sentence to whipping, if specially empowered by the Local Government (\* 82)

A Jury is required in every criminal trial before a High Court Juries are of two kinds, Special and Common A special jury is composed of persons taken from a special list of about two buildred. In every case where the officine to be tried in symmishable with iteath, and also in such other cases as a judge, of the High Court may direct, the trial is to be before a special jury (e 276). It all other cases this trial takes place before a common jury, i e composed of persons whose names appear in the general list of persons limbe to serve as jurors

Trials before a Court of Session are ordinarily conducted with the aid of assessors, two or more in number but the Local Government can, by order in the official Gazette, direct trials before any Court of Session of all offences, or any particular class of officiaces to be by jury Section 120 of the Code cummerates the persons exempt from liability to serve as jurors or assessors and clause (h) of this section includes among those exempted 'surgeons and others who openly and constantly practise the medical profession

When an accuse I person appears to be of unsound mind, and consequently incapable of making his defence—the magnistrate shall first inquire into or try the fact of such unsoundness of mind and it this be proved the trial shall be postponed and the magnistrates shall cause the accused to be examined by the civil surgeon, or such other medical

officer as the Local Government directs

Coroner's Court.—This is a preliminary court of inquiry, into the cause of all accidental and sudden deaths, where there is any suspicion of foul play. In India the Coroner is restricted to the presidency towns, for the provinces the district and other magistrates are ex officie coroners, although soldom performing the duties, the inquiry being conducted by the police in correspondence with the civil surgeon, see above The coroner views the body at his inquest with a jury. At this court no accused need be present as no one is being fried, unlike a magistrate's court which is a court of inquiry, not into the mere cause of death, but into the clipability of a person accused of some specific criminal act or negligence of a criminal kind, and where the accused must be present, and where witnesses may be cross examined, and the simple cases be death with summerchy.

At the coroner's court, however, any 'suspected person' must be present if possible, and has the right of producing witnesses, cross examining humself or by counsel, and of making any defence or statement he desires When a suspected person is ill the inquest is adjourned till he is able to attend The coroners court also inquires into the culpability of a person!

Offence by 'illegal emission' (Penal Code, s 22) e.g. a woman may be committed for murder by intentionally omitting to the the cord or to supply her infant with food (see chapter on 'Infanticide )

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suspected and returns a verdict specifying the offence of the suspected person, og 'culpable homicide amounting to murder,' 'rash and necligent act, etc. The coroner in India has the

nower to commit to the sessions direct

In all cases of fatal accident and sudden and unexpected death under suspicious circumstances occurring in practice, the attending medical man should never grant a death-eertificate when he cannot conscientiously certify the true cause of death, even should the family of the deceased press for a certificate to save the publicity of an inquest. It is his duty to report the matter to the police or the coroner direct, for afterwards if the magistrate or coroner be not satisfied that the death was from natural causes or simple accident they may have the body exhumed after burnal and if foul play be discovered make the medical man who wrongly certified an accessory to the crime. I or instructions on the important question of Death Certificates see under that heading

The Duties of a Coroner in India are thus defined "Where a coroner has reason to believe that the death of any person has been caused by accelent homeade or suicide or suddenly by means unknown, or that any person being a prisoner has died in prison and that the body is lying within the place for which the coroner has been appointed, the coroner shall inquire into the cause of death -The Coroner's Act (Act IV of 1871) \* 8 Other provisions are That an inquest need not be held in a case where a prisoner has died in prison from cholers or epidemic disease -s 9 That the coroner may order a body to be exhumed -11 That the inquiry is to be conducted by the aid of a jury (of 5, 7, 9, 11 I3 or 15 in number) who, with the coroner, are to view the body ss 12, 15 The coroner is empowered to order a post mortem examination "
with or without analysis of the viscera, to be made by any medical witness summoned to attend the inquest, and such medical witness other than the chemical examiner to Government shall be entitled to such reasonable remuneration as the coroner thinks fit - 18 Exidence is to be given on oath (s 19) reduced to writing by the coroner (s 20), and the jury are to return a verdict (# 23) A coroner may appoint a deputy coroner to set for him when sick, or absent from any lawful or reasonable CRUSE -s 28

#### Procedure in Courts.

To these courts the medical man is summoned to attend by a subpoena, a writ commanding attendance under a penalty. In civil cases it is necessary that a fee, termed conduct money, should be offered on delivering the summons, if this be not done the medical man may, in civil cases, previous to being sworn refuse to give evidence till any reasonable fee demanded has been paid But it is chiefly with regard to criminal cases that the medical man has to give evidence, and he has no option

but to be sworn and evamined irrespective of the question of fees  $^{1}$ 

Fees in cross examination in cruninal cases—In support of a rule obtained on behalf of Iswar Chunder Ranth, calling upon the district magnitude of Dacca to show cause why the conviction and sentence passed on the petitioner should not be set aside and the trial resumed on the ground that the petitioner was not allowed to cross examine the medical wriness in the case evcept on payment of the usual costs and compensation. The petitioner was convicted by an homorary magnistric of Namyangau, of causing hurt and was sentenced to six months regroup in the proposition of Rs 100 or, in default, six weeks' additional impresonment and to a fine of Rs 100 or, in default, six weeks' additional impresonment. Their lordships made the rule absolute, belong that the petitioner was entitled, under s 350 of the CPR, to cross evanume the witness without payment of costs or compensation (Galeutta High Court)—In glatish mr 2 3pd January, 1000

On being called into the witness box before your evidence is taken you have to be sworn. It is well for obvious reasons in taking the orth not to kiss the book, but to claim to be sworn by the more saintary Scotch form. I or this hold up the right hand above your head and say in a loud, firm tone "I swerr by Almighty God, as I shall answer to God at the last day of Judgment, that I will tell the truth, the whole truth and nothing but the truth." Then your evidence will be taken.

#### Medical Evidence.

Every fact which is referred to in law must pass through the process of proof by testimony. How this testimony is elicited in India is detailed in the Indian Evidence Act (Act I. of 1872). Evidence is given in two forms (1) documentary, or (2) oral

Documentary evidence comprises all documents produced for the inspection of the court  $\;\;\Gamma or$  the medical jurist this comprises —

i.t 1 Certificates of death, ill health, insanity, vaccination, its etc.—Death certificates must be given free of charge if the Zemedical attendant knows the cruse of death, even though his attendance fees have not been paid, he "must give a certificate."

When a medical officer, other than a civil surgeon or medical officer of any grado in the civil employment of Government is called upon to make a post mortem examination, he should be pold a fee of Rs 16 for the same Should be be summoned to give evidence in the case in court he is not entitled to any further remuneation beyond the ordinary travelling allow ance of a witness. For a medico-logal examination, other than a post mortem examination, the fee is Rs 10 or in the same conditions—[Government of India No 1970, dated 23rd June, 1800] and No 8050, dated 11th August, 1889]

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to the best of his belief and knowledge" and "a reasonable excuse" must be given for withholding a certificate (see p. 98). Medical certificates must now be stoned by registered medical

practitioners in Bengal and other provinces where the register has been instituted.

2 Medico-legal Reports.-These are the formal reports of an examination made by a medical man under a warrant from a magistrate coroner, or authorized police officer in cases of assault, murder, etc.

These reports (see Form in Appendix III ) should always . be prepared with the utmost care, one of these may prove the death warrant of a murderer. The report should give (1) Date and place of examination and name of witnesses; (2) External examination (of living, pp 31, 66, etc., of dead, pp 38, 74, etc.); (3) Internal examination in fatal cases (p 95), (4) Reasoned opinion giving the inferences drawn, (5) Signature of reporter. All the times, dates, and numbers should be expressed in writing, and all articles submitted for examination should be labelled with a distinguishing number for reference, and the names noted of the officials or other persons from whom he received any articles, information, or who identified the person or body. Technical terms are to be carefully avoided unless their meaning is made clear

The oninion based on the facts noted should be stated briefly a and clearly, and given with the utmost caption (see pp. 71 and 98) For the apparent or alleged cause of mury or death is

<sup>1</sup> The Bengal Medical Act 1914 (Bengal Act VI of 1914) has since been brought into force, section 80 of which lays down that no certificate required to be given by any medical practitioner or medical officer under any Bengal Act or any Act of the Governor-General of In ha in Council in force in Bengal shall be valul, unless such practitioner or officer is registered under the Medical Acts or this Act The Bengal Council of Medical Registration main tains under section 15 of the Act a Register of Medical Practitioners who are eligible under section 17 of the Act for such registration, and publishes annually, under section 32 of the Act, a list, entitled the "Annual Medical annuary vades section as of ton Act, a list, entitied the "Annuar larguest Luct," of the numes for the time being selected in the Register of Registered Luct, and the numes for the time being selected in the Register of Registered been replaced by this "Annual Method List". In view of the promising of section 30 of the Act, and as under section 25 of the Act, a registered practitioner, who gives a false certificate, is hable to have his name removed from the Resysters and consequently from the "Annual Method List," the Gas error, 'n. Commul-sun-disrete, n. malifination de 'tre orders contained in paragraph 2 of the Resolution of the Suck July 1910 cited above that suched certificate granted to ron-gazetted afficers of Garenment by registered Medical Practitioners whose names are borne on the aforesaid " Annual Medical Inst!" shall be accepted without the countersignature of Civil or Presidency Surgeons as the case may be. If, however, the authority concerned doubts the genuine-ness or veracity of any such certificate, he may institute an inquiry, the result of which shall be reported to the Bengal Council of Medical Regis tratton,

not always the real one, thus in India it is a common practice to hang up the dead body of a person who has been murdered so as to create a suspicion of sucule (see 'Ilanging' in Chap VII.) and there may be fatal concussion of the brain from a blow which cannot be ascertained by a post mortem inspection or dissection, but only inferred from the history of the case. If the medical attendant or registrar makes use of the history of ble case as supplied to him by the police or others he should be careful to state this explicitly in his 'opinion' eg'. From the history of the case and from the post mortem appearance I am of opinion that the deceased died from shock caused by a blow, and where the opinion cannot be given until after the result of chemical analysis of the viscera is known this should be stated accordingly

Both of the above classes of documents require to be sworn to orally as true by the person who drew them up in the more scrious cases but the following documentary ovidence is ac cepted evilibration oral evidence in court (1) Dying declarations

(2) Expert opinion from books

## 3 1 Dying Declaration

Statements written or verbal made by a person who is dead as to the curse of his death or as to any of the circum stances of the trunscation which resulted in his death are admissible in cases where the curse of that persons death comes into question no matter whether the person making such statement was or was not under expectation of death at the time of making it.—[I & A s 32 and Cr P C s 164] If an injured person is likely to succumb the dector failing the police should arrange for the declaration to be made properly in the presence of a magnetiate if possible failing whom he may record the declaration himself

The declaration should if possible be written by the person making it otherwas it must be taken down in the identical words, utfaced by the dying men in his axis, vernacular and nothing suggested or added. It should be read over to him and then if possible signed by him and attested by the writer and any attnesses present. It should then be forwarded in a sealed envelope direct to the magistrate who would ordinarily

inquire into the case

At outlying dispensaries—The hospital assistant in charge should at once call on the Sub Deputy Collector or Tahsildar, or in his absence or when he has no magisterial power the nearest honorary magistrate to record the dying declarations

of such persons as are likely to die and are in a hi state to make a statement. If there is, in his opinion, no time to call on the Tahsildar or an honorary magistrate, he may record the dying declaration himself

The State of Mind of the declarant at the time when he made his declaration is of great importance

It may here be noted that according to the law of England, the person making a dying declaration must not only be actually moribund but must have no hope of recovery and believe recovery impossible

#### 3 Printed opinions of experts

I year opinion expressed in any treatise commonly offered for site and the grounds upon which such opinions are held, may be proved by the production of such treatises, if the author is divid or termed by found or has become interprobe of groung evidence or crunot be called as a wintess without an amount if delay or expense which the court rights as unreasonable— I k. A \* S.

Case—un Puopean ma domaing bont at Calcutta was found in his rocu. blee ling from a woun in on the buck of the head. A police officer unquire! 'How dud this huppen? He righted, 'She (his wide) threw a glass at me. The wife said 'Dout as what, you know I did not lo it he has fallen out of led on a cup. The man was drunk, and never spoke natuonally up to the time of his death, three hours after Portions of the enamel of a tra cup (blood) fragments of which were found scattered about the comp over romain the bound and the programment of the enamel of a tra cup (blood) fragments of which were found scattered about the comp over romain the beat when the performance At the get mortem examination transpatic extravasation of blood on the brain was found attributed to confer copy, and the universal medical quision was that the wife statement was the true one and that when the man accorded he he was not incentally in a condition to know how the injury had been inflicted. A fall upon a tea cup could produce, the appearances described whereast he power of a cup could produce the appearances described whereast he power of a set force the enamel under the percuration. The wife was acquited.

In the case of a will by a group man, if no magnetase can be obtained the moderal attendant may recent it, in which case the attentation classes should not be forgotten and care should be taken that its conditions are structly complete with ——" signed by the testator A B, in the presence of us (these must always be two witnesses), present at the same time, who at his request un has aght and presence and in the presence of each other have attacked and subscribed the same.' All alterations must be initialled by both testator and witness, as well as each page, and the foot mindle of the presence and by his direction. The testator must be conceined at the presence and by his direction. The testator must be conceined at the witnesses attack their signature.

- 3 Endence given in a previous judicial proceeding by a witness who is dead, or cannot be found, or is inepable of giving evidence, or is, kept out of the way by the adverse party, or whose attendance cannot be obtained without an amount of delay or expense which the court, under the circumstances of the case considers unreasonable, is admissible under certain conditions (e.83). Under this rule the deposition on oath of dying person, taken by a magistrate in presence of the accused, becomes almostable in place of a dying declaration and when the circumstances of the case permit, it is always advisable to take steps to obtain such a deposition.
- I Deposition of a civil surgeon or other metheal witness, taken and attested by a magistrate in the presence of the accused may be given in evidence in an inquiry or trad or other proceeding under the Code of Criminal Procedure, although the deponent is not called as a witness, but the court may if it thinks in summon and examine the deponent -Cr  $\mathcal{C}$  , r  $\mathcal{C}$  , r and r
- , 5 Any Document purporting to be a report under the hand of any eleminal examiner or assistant eleminal examiner to Government, upon any matter or thing duly submitted to him for examination, or analysis 1 and report, in the course of any proceding under the Code of Crambol 1. Procedure, may be use 1 as evilence in any inquiry, trial, or other proceeding under the said Code —C I C ≠ 500

Oral evidence must in all cases be direct it if it refers to a fact which could be seen heard or perceived in any other manner, it must be the evidence of a witness who says he arw, heard, or so perceived it, if it refers to an opinion or the grounds on which that opinion is held it must be the evidence of the person who helds that opinion on those grounds and not mere hearsy. Oral evidence is the more important of the two, as it admits of cross questioning so that the giver of documentary evidence is subject to be summoned for oral examination. If oral evidence refers to the existence of condition of any material thing, the court may require the production of such a thing for its inspection viz a blood strandoweapon, or article of clothing a portion of eliminated poson, etc, etc. Hence such article should, always after examination, be proserved, if possible, for production before the court "Circumstantial" evidence attests one of the subsidiary circumstances of the case, e.g. in case of an alleged stabing of A by B on a river-inna as 4 o chock on a principality circumstantial.

# B on a river-bruk at 4 octock on a princial ray, circumstantial evidence would be that I saw B with a knife in his hand at ten minutes to four on that day near that place

#### Witnesses.

Evidence is of two kinds, namely, (1) 'Common,' or testi nony to facts which the ordinary witness has actually observed himself and (2) 'Expert,' or interpretation by expert persons or specialists of the facts observed by others or of recondition of the state observed by others or of recondition of the state of the medical witness usually gives ordence of both kinds, but in nearly nine cases out of ten as an expert A 'Skilled' or 'Scientific' witness is a rather loosely applied term to mean a person of specialized knowledge of some technical subject and who may be on 'expert but who usually has no firsthand knowledge of the particular case A 'Hostle' witness is one who is assumed to have an interest or inclive an econocaling part of the truth or in group positively, false evidence

- 1 A 'common' winess testhies to the facts "Fact," as defined by the Indian Evidence Act," means and includes (1) my thing state of things or relation of things expable of being perceived by the senses, (2) any mental condition of which any person is conscious." The medical man is a common writess when he testifies to the exact size and number of wounds, blood stains etc of a wounded person he has examined, the exact weight of solids and volumes of fluids he refers to, the circumstances under which he found the body, any statement or confession made by the dying person, the actual cruse of death, etc.
- All persons are competent to textit unless the court considers that they are prevented from understanding the questions put to them or from grung rational answers to those questions by tender years, extreme old age disease whether of body or mind or any other cause of the same land (I? A = 118) in certain special cases (ib = 121 129) a winness may, on certain grounds claim examption from being compelled to answer certain questions  $e_{I}$  on public officer shall be compelled to answer certain questions  $e_{I}$  on public officer shall be compelled to answer certain questions  $e_{I}$  on public officer shall be compelled to answer certain questions of the same constant to the public natices when the public natices we will be a same constant to the public natices when the same constant is a same constant to the compelled to answer has answers cannot be used as evidence against him (tb,  $\epsilon$ , 182) in addition to the checks on untrivitificuless of a witness afforded by the provisions of the Frand Code relating to the giving of (tilse evidence (ta, 121 126) and the optimizer of the provisions of the Frand Code relating to the giving of (tilse evidence (ta, 121 126) and the provision of the provision of the provision of the frank of the provision of the pro
- 2 An 'expert' witness—This is defined to be a person "specially skilled in foreign law, science or art, or in questions as to identity of hand writing or finger-impressions"

Exemples of expert evidence—(a) The question is whether the death of A war caused by poison. The opinions of experts as to the symptoms produced by the poison by which A is supposed to have died

are relevant (b) The question is whether A at the time of doing a certain act was, by raison of unsoundness of mind incapable of knowing the nature of the act or that he was doing what was either wrong or contrart to law. The opinion of experts upon the question whether the symptoms exhibited by A commonly show unsoundness of mind and whether such unsoundness of mind usually renders persons incapable of knowing the nature of the acts which they do so chrowing that what they do is either wrong or contrary to law are relevant. —I.1 A # 47.

Medical eyperts are skilled in such special branches as toxicology, obstetrics, instantly, etc., and also in the interpretation of wounds etc., and when the medical witness is called on to answer questions of opinion uther on the facts observed by himself or others he becomes an expert witness whilst the ordinary expert witness usually is asked meruly for his opinion on certain facts of the case and acts as an interpreter of facts without having personal knowledge of them. Provious personal knowledge of the facts of a case pricludes a witness from taking any possible advantage of the status of an expert as regards compulsory attendance at court etc.

Cate —A medical man who has not seen a corpse which has been subjected to a post mortem examination and who is called to corroborate the opinion of the medical man who mad, the examination and gave his opinion as to the cause of death is in the position of an expert —Queen Limpress v Med et all Mullic 13 Cal 3 or

The medical witness therefore must bear in mind this distinction between 'common' and 'expert' witnesses, and when stating facts of his observation avoid giving opinions or inferences on these facts until asked to do so It is, however, as an expert that he is mostly examined and then it is a decision rather than evidence which the law demands of him when replying to such questions even in regard to facts observed by himself as -Is this wound dangerous to life? Was the wound accidental suicidal or homicidal? Was it inflicted before or after death? With what kind of weapon was it inflicted? In answering such questions he should be careful to draw no stronger inference than the facts warrant and when the facts do not warrant a decided opinion either way, he should state his reasons for being unable to give a definite opinion on the point Txperts may refresh their memory by referring to professional treatises 2 The apparently contrad ctory character of expert evidence sometimes is largely owing to the partisan manner in which it is elicited. The expert is often a party witness, each side being permitted to employ expert witnesses, and they are asked by their side to answer questions on the assumed facts which are most favourable to their side. Then

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in cross-examination the expert has to answer fresh hypothetical questions based on an altogether different combination of the assumed facts with the view of contradicting the original evidence

#### Examination.

Your oral evidence is taken in the following order -1

1 Examination-in-chief,—This is a series of questions put to you by the counsel for the side on which you appear with the object of placing before the court in a clear minner all the principal facts you know that bear upon the case in point. He knows from his 'brief' the nature of your evidence, and is not allowed to put leading questions A 'leading question is one to which the answer is suggested by the tone and form of the question.

2. Cross-examination.—You are now subject to be ques

- tioned by the opposing counsel with the object of weakening your evidence as far as possible by trying to show how your details are inaccurate conflicting or controdictory. You are for him in the position of a "hostile" witness. You must be prepared even for questions citicalated to dispuring your skill. Thus in a question of criminal abortion you might be asked. You are not an obstetine surgeon? How many cases of individently have you attended during the past year? In yeroes examination leading questions, the questions which suggest the answer wished for or expected, may be asked, but if the question cannot be correctly answered in this way, you should inform the court accordingly, and in no case attempt to answer questions you do not clearly understand. Sometimes lawyers unfundiar with medical science ask meaningless questions.
- I acts not othern see relevant are relevant if they support or are in consistent with the opinions of expects when much spanness are relevant. Illustration (s)—The question as whether position of the certain position. The fact that other persons who were positioned by a certain position. The fact that other persons who were positioned by that proton exhibited certain symptoms which experts afirm or leny to be symptoms of that position are relevant—I P 1 s at 9.
- 3 Re-examination.—This is made by the counsel of your own side for the purpose of explaining apprent inaconnectes or discrepances in your statements which may have been brought out by your cross-examination. No new matter may be introduced at this strict without the consent of the judge or

the opposing counsel, and the opposing side may cross-examine on the first point. The judge and jury may question you at any stage to clear up ambiguous points. It often happens that the medical evidence is so little in dispute that no crossexamination is field.

Questions which may be asked.—For a list of many of these, see Appendix I, which should be carefully studied in detail, as several of them will almost certainly be asked

## Hints on Giving Evidence.

The medical witness should remember that he is not, and should not be, a partisan on either side. He has come to fell the truth, what he knows about the case and not to clench the case against the prisoner. As he is not ormiscient, he must not be ashamed to say, 'I do not know'. His evidence ought to impress the judge and jury, and, if he can, he should try to make his evidence a self-evident truth.

Notes in court.—All facts of medico-legal importance observed by you in a case should always be committed to writing in your own hand, on the spot, with precise time and dates or as soon after as possible, and such notes may be taken to the court to reficely your memory, provided permission of the court is obtained. But as the evidence of a witness must be ord, as far as possible, you are not allowed to read out such notes, as evidence to the court. In giving date and time state it precisely. On Tuesday the 9th December, 1919, I saw Mr. P. at 715 a.m., etc.

"A winess may, while under examination, refresh his memory by referring to any writing made by himself at the time of the transaction concerning which he is questioned or as soon afterwards that the court conders it likely that the transaction was at that time firsh in his memory. The winess may also refer to any writing made by any other person and read by the writiness within the time aforestudy, if when he read it he knew it to be correct. Whenever a winess may refresh his memory. Frefer to a copy of such document. Provided the court be satisfied that there is sufficient reason for the non-production of the original An expert may refresh his memory by reference to professional treatases" (I. E. A., s. 159). Any writing used to refrish memory must be shown to the adverse party it required (I. E. A., s. 161).

Speak slowly, loudly, and distinctly, to allow both judge and recorder to hear easily, and to make notes of what you say

<sup>1</sup> I. E A , s 159, Niz Ad Rept , 4th April, 1854

Use plain and simple language, avoiding tichnical terms with are not intelligible to non-medical persons, such as cicating, 'continuon,' gastine mucous membrane,' percordum' 'cochymosis,' 'traumatio,' etc., employ instead 'scar,' bruse,' 'hinning membrane of the stomach,' etc.

Avoid superlatives and exaggerations Avoid such expresions as "there was an enormous bruse on planntif's shoulder, the blow must have been a savage one delivered with great violence," and that 'the pupils were piu-points"

Be precise and concise For example, be prepared to give the date and time of each overt about which you have to give evidence the exact mersurement of wounds the exact weight of solids and volume of fluids, etc. Photographs should be utilized it vaulable.

State facts only, not mere opinion unless expressly asked for these latter. Thus, in the case of suicidal hanging, you should only certify to the fret of hanging, for whether it a suicidal or homicidal, or accidental, is a matter of expert opinion or other cividence. Give your answers incospective of the possible result on the trial.

Keep your temper during cross evamination. To love it would convey the unfavour-ble impression to judge and jury that you are hasty in forming conclusions and thirdren untrustworthy. If compelled to answer let or 'No' to a question in cross orimination when it would convey a false impression, quality it by an explanation, and appeal to the judge if you think any question unfair.

Professional secrets —In a court of law a medical aduser is bound, if asked, to disclose otherwise involable secrets, if not self-incriminating, which he may have had confided to him professionally by a patient, as in questions of legitimacy, ceneral disease with refrence to discrete, etc. If the medical attendant through conscientions scruples refuses to answer, lot is hable to be committed for contempt of court. In such case, it is well for the medical man first to appeal to the judge for a railing, claiming privilege to decline to give such secrets, so that if the judge still rules that it is necessary for you to speak, it will be evident to all that you divulge these secrets only under compulsion of the law of the land.

Lond Mansheld in 1776 put it very clearly—" If a surgeon was voluntarily to reveal secrets to be sure he would be guilty of a l reach of honour, but to give that information in a court of justice which by the liw of the land he is bound to do, will never be imputed to him as any indiscretion

whatever." (Duchess of kingstons trad for biggmy, 20 S T., pp 678, 735). Certanally even mercul (non enumal) cases there is a great deal to be said in favour of the custing law, for surely in the interests of humanity and purity it seems undesarable that a woman to whom a loadissome disease has been communicated by a dissolute husband should find herself chained to him for life, and be unable to gain the ordinary means of redress, because the only witness who can prove this undernal medical fact has scruples of conscience, or is technically excluded from testifying I or further remark so in this suffect and a case successfully resisted, see Chap 'LV, on' Medical Obligations

Quotation from books.—You are not allowed to quote in your pepies any books by an author who is alive, on the principle that evidence should be oral, and the giver of it should be present for cross-trainination. Books are sometimes quoted in court by counsel, and the witness is asked whether he agrees with the quotation. In such cases the witness should, before replying ask to be allowed to read it over himself, and see whether the context does not give it a different meaning from that assumed for it by the opposing counsel

In giving an opinion in court be well prepared beforehand, by the called upon to give an opinion what inferences drawn from the facts would tend to support either side of the case Consult the works of the leading authorities on these points, ascertain what opinions are therein expressed, and the grounds on which such opinions are breed, and frame your own opinions with due regard thereto. Be careful to draw no stronger inference and give no stronger opinion than the facts warrant. It frequently happens that the facts available do not justify a conclusive opinion being given one way or other in such a case do not hesitate to state so, but be prepared to state precisely your reasons for being unable to give a definite opinion on the point.

#### Lying in Forensic Psychology.

Lying is one of the great difficulties with which the Medicolegal expert, in common with the Judge, has to grapple in Europe, and it is by no means less provalent in India Children, otherwise mentally sound, especially if their moral education has been defective, or they have been associated with lars, may occasionally tell a lie from motives of fear, or to gain some private desire, or screen a friend, at a period when they are not yet able to distinguish clerify between their desired ideal and the moral quality of the means employed to obtain it. But it is the adult hars who he deliberately with the purpose to

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deceive with whom we have scriously to deal and for whom there is no such excuse and who constitute a menace to society and civilization

Habitual lying to a greater or less extent appears to be much more prevalent in civilized communities than is generally admitted although only a relatively small proportion of the individuals who practise it find their way to the criminal or police courts. It mentably tends in the direction of crime and is associated usually with some physical defect in the brain it is absent relatively or absolutely in the higher normal and well lalanced tyres of brain and intellect, to which lying in all its forms is repugnant while it is notoriously prevalent in degenerates imbeciles and insanes. A common feature which the habitual har shares with the feeble minded endentic hysterical and insane is that they are not a whit alashed at being found out. They are thus Pathological Liars' in con tradistinction to the Occasional Normal Liar who tells a he occasionally to conceal some inconvenient truth or it may be deliberately to get some person against whom a spite is cherished into trouble-a common motive both in India and in I urone Between the habitual and occasional lying comes a good deal of partisan literature other than fiction and certainly that of belli-erent politicians in war time who thus approximate to the imbeciles and insane

The Pathological Laws however are seldom so completely diseased as to be altogether insensible to the difference between right and wrong even when subject to haliuemations. They usually know their stories are files but they wish they wretten and they hope by cumingly contrived plausibility that people may be deluded into accepting them as true. They are often extremely clear and personally attractive. Some enjoy success as swindlers others have caused grief to their families by figuring in causes a libres in which they accused their parents or guardians of the most abominable erime, wearing tales so

plausible as to deceive the general public

An interesting analysis of the antecedents and I sychology of over sixty well authenticated cases of such inveterate hars has recently been published by the Drs Healy, which shows that invariably there has been some mental defect in the family which may range from mem unability to every deshal, my to actual instanty. The putient herself—for it is to the female sex that most pathological hars belong—generally has shown a tendency to excessive lying in childhood in the years when character is forming. In some cases this may have been

imitative in a home where some member of the family was notorious for lying or keeping up a social position by makebelieve. In other cases it may be due to the influence of bad companions. Often a good conversationalist and sometimes a ready writer, she is intensely self central carrin, nothing for the opinion of others. Though prone totably to embruder facts or intent interesting occurrences in which she plays a leading part, she is as a rule suggestible. Very often she i uni away from home and is found by kind hearted strangers to whom she tells a thrilling tale of how her parents beat her till it dawns upon the philanthropist that he is harbouring an incerngible har, though on the other hand owing to their innate cunning they may never be found out and exposed. Such are the class who bring false charges of immoral assuits. Habituees to the abuse of alcohol, morphine and occaine are also especially addicted to

pathological liars who tend in the direction of crime

It is only by careful questioning cross questioning and traps carried out at more than one interview that one is likely

to elicit the real facts and reconstruct the true case

#### Special Difficulties in detecting Crime in India Medico-legally

Some of the special difficulties in the way of the medical jurist in India getting at the truth in criminal cases are due to —

- Rapidity with which decomposition destroys dead bodies in the hot climate
- Facilities for concealing and destroying dead bodies together with the general practice of rapid cremation or burial a few hours after death
- 3 Insufficient particulars of crime in the police reports accompanying the alleged assaulted person or a de composed dead body
- 4 Untrustworthiness of so much native evidence, owing to the wide prevalence of false swearing and fabricating false charges
- 1 Rapid decomposition—This tends to obliterate the traces of the cause of death whilst rendering the autopay very trying to the medical officer, whose duty nevertheless is to per form the examination as thoroughly as possible—The despatch of the dead body or its prolumnary examination is often in country districts delayed in the hot weather for several hours with

consequent loss of evidence owing to the responsible official shrinking from contact with the dead body until evening or the next day as contact with a corpse prevents a Hindu mixing with his family or friends until purified by more or less claborate ceremontal bathing I or this reason a fudged report may be sent in without the body having been inspected at all When as often ham ens the body does not reach the medical officer for examination until several days after death after laving been carried scores of miles in the heat on mens shoulders it is then in such a horrible putrid condition 1 as to make even an external inspection very trying and detailed lissection uscless It is thus necessary that the police report accompanying the body should furnish the medical officer with sufficient particulars to indicate the direction in which he should pursue his search into the cause of death when decomposition has fully set in he cannot be expected to throw much light on the cause of death Nevertheless at is well never to refuse to make an examination even in such cases 1 or wounds inflicted during life can for a considerable time, be distinguished in the dead body from those inflicted after death and from mere decomposition changes Certain tissues such as those of the uterus 2 resist decomposition for t long time certain poisons (such as arsenic) may persist for many months fractures will be evident though if the decom position is far advanced it will be difficult to say whether the fracture occurred during life or not and some important identification marks may be elicited

2 Rapid cremation or burnal of bodies —The bodies of Hindus on death are cremated and those of Mohammedans are burned on the day of death assually a few hours after apparent death. Turops in residents also are almost invariably burned on the day fley die. Besides these legitimate methods of disposal very peor people often throw the bodies into rivers and lake. Unusual facilities thus exist for devroying traces of murder by concealing the dead bodies in tivers wells ponds swamps dry watercourses thickets of waste land and jungle rubbish lears standing crops, stacks of wheat or straw or heaps of chall. Most of these places are infested by carrion feeders (dogs neckals vultures crows erocoalles fish ints etc.).

Although the statute (C I C s 174 (3)) expressly states it at bodies have to be send for meiorial rammentum in doubtful cases only if the state of the weather and the d stance admit of its being so forwarded without risk of such putterfact on on the road as would reader such examination missless—this provision is not insuffly observed, and the thin sprinkly ng of wood charcoal does it the to check the adjancing decomposition.

\* Au Ad Rept N W P 1854 204 ed 1852 p 1121

which soon mangle the corpse beyond recognition or raduce it to a skeleton. The commonest way of disposing of the body of a murdered person in the plains is to throw it into a river, or into a disused well—for this purpose it may be trussed up and carried many miles from the scene of murder, or tied to a pole and drugged along if the murderer be single-handed. The next most common way is probably to hide it in the juugle Occasionally such bodies are buried under the mud floors of houses, and usually in the house of an invocent party. Certain Hindus who murdered a fellow Hindu and his mistress plotted to bury the woman's body in a Mohaumedan grave, which no ene would think of opening, and to leave the mu's body in the house to make it appear that he had been inurdered by his mistress, who had absconded. A case came under my <sup>1</sup> notice where the body of the murdered man was buried in the bed of a hill stream, which for this purpose had been diverted from its channel and then turned on again

3. Insufficient particulars in the police-report which accompanies the body.—In India the medical officer rarely sees the dan body when and where it is found, and has to depend for such important information on the inergie and vague reports of untrained persons. Such statements as "betieved to be beaten," etc, are often contradictory, and give Intite useful or trustworthy clues. Although it is a principle in England that the medical officer should be furnished with as full particulars as possible to assist him in finding out the true cause of death, this principle has been objected to by an Indian judge? If, however, the medical officer, who holds the position of a police surgeon, be purposely kept in the dark as to the facts and ascertained circumstancts attending a death on which he has to report, with only the decomposed body available for trammation, there must necessarily be a great likelihood of justice miscarrying.

1 L A Waddell. It occurred in the Ranchi District of Chota Nagpur in

1886, while I was acting there as civil surgeon

\*The civil surgeon of Cawapere, in 1892, with reference to a body which had been sent to him without particulars as to the alleged cause of death, asked that in future he should be supplied with the history of the bodies sent to him for report so that he might have some guide to the organs most requiring scientific examination. But the sessions judge thought "this would interfer with a principle of certinail justice and would be analogous to patting leading justices, the surveyers to which would not be evidence, nor would it be fair to the principle of certinail justices and would be analogous to patting leading justices, the surveyers of the server of

# 4. Falseness of much of the evidence given by natives of India.

"No crime causes g loss of ensie is com mitted by succaring falsely to women theol ject of ine silesire at marriage for the sake of (procuring) folder to a cone or fuel (for oneself), and is order to show favour to a Brahman, —May Copy 11, 261

let the disgrace of perjury in also insisted upon 'Naled and storn formented with hinger and thirst and deprived of night, shall the man who gives false evilence go with a potcherd to beg food at the door of his enemy —MAY, 19, 235, 319, 235

The untrustworthiness of native evidence in India is In nearly every case in law, more or less false evidence is given, whether it be from fear, stupidity, apathy, mulice, or innate deceit It is referred to by the Privy Council as " the lamentable disregard of truth prevailing amongst the natives of India ' As regards Bengal, the Inspector General of Police 4 states that this "is a country where perjury is the rule and not the exception, where no man will tell the whole truth or the simple truth where false witnesses can be bought for a few annas" The constant difficulty, therefore, is to sift the truth from the falsehood Such false charges are generally supported by marvellously minute direct and circumstantial details The 'too perfect" character, indeed, of such evidence at times leads to it being suspected and its falsity exposed

A very common form of conspiracy is to cause a person to disappear, and then to charge with murder some person against whom a spite is cherished. A plausible explanation is given of the disappearance of the body of the alleged murdered person, or a putric corpse is obtained from the adjoining river and, gashing it in several places, it is brought forward as the remains of the missing individual. In such conspiracies circumstantial details are not infrequently sworn to by several persons, testifying as eye-witnesses to alleged facts of the murder, to the burnal of the corpse, etc., so that conviction for the murder may be duly passed, and the falsity of the whole

<sup>1</sup> Laws of Manu. Translated by G Buebler 2 Cowell quoted by Chevers 1f, p 86 4 Lept Benj Police for 1866, pp 10, 53

<sup>•</sup> Id

proceedings not be discovered until the reappearance alive of 'the alleged murdered person

Cases -(a) False evidence -Ibrahm Beg, a wealthy mahdran (mer chant), was convicted of the murder of his young wife Chumbelee the day previous to the one appointed for the execution of the convict an individual informed a young I nglish civilian that Chumbelce was alive, and led him to the place where she was kept concealed by a gang of fulurs in a subterranean chamber of a tomb. It then turned out that the whole affair was a conspiracy got up by a man named Khan Beg, the mah 7 an s next heir This man, with the assistance of one of the maha jan s servants first excited Ibrahim Beg s jealousy, and led him to beat his wife. Her loud screams were heard by the neighbours. This then ablucted the wife and handel her over to the fakirs, in whose custody she was subsequently found Just before the quarrel between Ibrahim Beg and his wife, the conspirators had got hold of a female body cut off the head of this put on the arm of the corpse one of Chumbeleo s bangles, and buried the boly in the courtyard of Ibrahim Be., s house Here it was discovered on the day after the quarrel, and was supposed to be the body of Chumbelee The man who gave information that Chum belee was still alive was a subordinate in the affur, who was dissatisfied with the remuneration given him for his services -- Chevers Man p 54 (b) Regarding another case the sessions judge wrote -" It would

be impossible to imagine a case more completil, satisfactory as regards at least the guilt of Abdool kurem (the falsely accused) than this, because when the [police] darogals a report was completed and as in fact it remained until the appearance of Pirtab Arain (the alleged murdered man) brought to light its real character. The provecutirs was attenuable to the missing man, the principal witnesses were his wife and his cousin, while the prisoners own servisis detailed at length circum stances attending the burnal of the bods. There were no inconsistencies and no contradictions in the evidence which from first to last gave the hearts the impression that a heurous crime had indeed at last been brought to light in spate of a powerful combination to conceal it —Aid Int. 1837 1 2.90 Other cases of this kind —Vix Ad I pet, I NY P.

1854, 381 , Police Rept , L P 1841 p 87

False confessions of fictitious murder—The falsely accused persons, even when not the subject of delusional insanity, may confess to have done the alleged murder and yet the alleged murdered person appears alive in court—

Case — In the Mirrapur district a Reynat widow known to be unchaste eloped with a paramour. The headless body of a woman was found in a well, and was supposed to be the body of the widow who had eloped. The widow is brothers were charged with her murder, confessed their guift (?), and were convicted. Just oferor tieps were sentenced the missing widow appeared, she had heard by chance that her bothers were charged with killing her, and came forward to clear them. The brothers said they had confessed to the murder because they thought it was hopeless to plead innocence — Chevers Med Jur., p. 69

False evidence fabricated by police—The native police, whose duty it is to make the preliminary report on criminal cases, are drawn from the ranks of the masses, and many are

still credited with suppressing incriminating evidence for a monetary consideration as well as with extorting false con feasions by torture or threats through mistaken zeal or other motive all tending to obscure the truth. Thus a head con stable at Rangpur in Bengal induced a woman to say that a certain corpse found floating on a river was that of her adopted father He further instigated her to charge five men with the murder At this juncture a sub inspector took up the case and the five men were arrested and kept for the might in the custody of these constables who maltrated their prisoners and thereby induced them to confess that they had committed the murder. When the trial was going on the missing man came into court 1 Again a sessions judge re cords - I do not credit the evidence of the eye witnesses as to the place where and the mode in which the wound was inflicted the eve testimony of the knife and the blow on the road was an after thought of the police to make the case more complete according to their infamous custom in these parts 2 So much suspicion clings to the evidence offered by the police that it is specially enacted that " no statement made by any person to a police officer in the course of an investigation under this chapter shall if taken down in writing be signed by the person making it nor shall such writing be used as exidence

#### The Indian Criminal

Indian experience generally supports the modern school of criminal anthropologists in regarding the criminal as a de generate Lombroso's hypothesis which originally was that i criminal type exists exhibiting a physical neurosis or degeneration of the brain that enables us to recognize a malefactor from birth has now undergone a good deal of change So far no physical signs which point to absolute criminality have been discovered, any more than it has been possible to discover the external marks of invincible honesty. Yet, although the great malefactor is not usually a madman but exhibits a marked degree of self-control lower down in the scale of criminality it is often very difficult to decide how far the creature in the dock is truly responsible Certainly, prisons all the world over contain a considerable proportion of persons under punishment who are little better than half witted. The population of almost any of the large prisons exhausts the scale of unfitness, and from it is recruited a good deal of the population of the lumitio asylum

The classification of criminals by Lombroso still holds generally good, namely (1) the political criminal, who may be, as the Italian sociologist calls him, "the true precursor of the progressive movement of humanity," and may be the hero, martyr, or even saint of another land or age. (2) the 'criminal by passion," usually distinguished by a previous honest life and genuine remorse, he never becomes a recidivist, his crime is usually a solitary event in his life, and careful examination as a rule fails to show any striking evidence of abnormality, degeneration or hereditary taint in the political criminal or the criminal by passion. (3) the occasional criminal, who has an element of innate criminality which leads him to commit crime when an opportunity offers and bid heredity is common in this class, (4) the habitual, or professional criminal, who deliberately adopts a career of crime, and commits it either helplessly, the degenerate class, or with great intelligence, the aristocracy of criminality, (5) instinctive or congenital criminals (criminal ne of the French, delinquente nato of the Italian) Loin broso identifies the instinctive criminal with the moral insine Criminals of this class form only a small percentage of the prison population but they are the most serious proportion frequently present well marked physical and psychical signs of abnormality degeneration, or disease They reveal criminality in its most pronounced shape, and they are related on one side to the occasional criminal, and, on the other, pass gradually into (6) the insane criminal, without any clear line of demarcation between them

That the criminal is "an oploptic more or less in disguise" is no longer held as it is not supported by fact, but that the criminal type is often a "professional" type has a good deal in its favour, though the rapid extinction of vicious families who cloose such a career is not favourable to the hereditary trans-

mission of such aptitudes

As an outcome of this conception of the criminal as a degenerate and a more or less half writed person, there has been put forward the ethical and eagensities plea for the reclamation and education of the criminal, less rigorous punishment, and the total abolition of the death penalty, for no doubt errine springs from conditions which punishment cannot touch. But these questions are outside the scope of this book.

The Indian criminals are perhaps, broadly speaking, of a somewhat milder and less vicious type than the average criminal in Europe There are relatively fewer of that gross anti social type of moral monster who infest society under the

stress of the higher cavalization. The great majority of violent criminals and murderers in India are criminals by passion, fairly well meaning and generally law abiding men, who, stung; into sudden madness by some insult or wrong real or fancied, to themselves or 'amilies take justice or retaliation into their own hands and so find themselves in the clutches of the Law A large number are criminal through natural stupidity and want of self control rather than inherent wickedness

Moral Insensibility, a truly criminal trait, is, however, often seen in atrociously unnatural motives for crime in India It appears also to enter into the well known apathy, usually considered fatalistic amonust natives of India, towards saving life in accidents People will look on calmly at the struggles of a drowning man without attempting to render him assistance and often do not attempt to save the victims of attempte I murder Thus a young woman was seen by a man at noon to throw a boy of ten down a dry well twenty feet deep The man never attempted either to catch the murderess or to help the child in the well He excused himself by saying that he had a boil on his foot and a loud on his back. Without throwing down his load he went on to his village and informed the child's father. The latter again made no attempt to recover the body until the evening

Inhuman callousness is sometimes displayed thus, a woman murdered a child for its ornaments which were worth less than six rupees (about eight shillings) and was found burning the child's body at her own fireplace (Leng Pol Rent , 1866, 172)

Murder of own family to fasten a charge on an enemy -The victim is usually an old infirm person or a child Numerous such cases occur every year A woman in Patna district poisoned her own little daughter, and concealing the body on the premises of a neighbour with whom she was at enmity accused him of having murdered her! A man in Jhansi (1885) killed his daughter because his neighbour had slandered her in order that the girl's blood might be upon the neighbour's head. A master murdered his servant (1881) and threw the body before the door of his enemy solely in order to bring a dalso charge against the latter A similar case occurred in Azamgarh five years later a boy was murdered by his grand father and uncle, they threw the body into a sugar cane field, and then charged the owner with the crime A still stranger story comes from the Mathura district. Randhir, a Jat, who

<sup>1</sup> Bengal Police Rept , 1868 p 189

had once been a thriving man in Randhirpur, fell into the hands of the money-lenders, lost his property and his house, and became for some crooked reason embittered against his old fellow villagers He made up his mind to bring them into trouble Taking his chopper with him, he met a little chamár girl, whom he took into a temple in Bahadurpur There he cut her throat and slightly wounded himself, and then brought a charge of dacoity and murder against the people of his old village."1 A man sentenced at Cawnpore as accessory to the murder of his own sister confessed that the deceased's own son and another relative had beaten her to death and had absconded with her property, and that he afterwards witnessed the partial burnl of her body in one of the apartments of the house in which they all resided as a joint-family. He had deceived the neighbours as to the cause of the unpleasant effluvium which proceeded from his house, by attributing it to the death of a snake in one of the drains The body was found several days after the murder in a locked room, the key of which was in the prisoner's possession 2

Case -(a) Murder of father by son amid crowd of witnesses in broad day to lay false charge at another man s door In 1902, a dhobi of the village of halanjan, thana Jam, in the district of Meerut, found that some clothes which had been given to him to wash had been stolen. He suspected two Dhanuks of the village, who had been in his service as watchmen, and a relative of theirs, and brought them before the remindars The Dhanuks protested that they knew nothing about the clothe-, so the dhobi, Ramzani by name, reported the matter at the thana. The head constable of Jham and two other constables returned with Rumzam to investigate the matter, and the head constable took up temporary quarters at the house of a Jat remindar named Jhunku, this apparently being the customary thing in the village After making several inquiries, and inspecting the hut from which the clothes had been stolen the head constable, whose name was Maz Ahmad, called several zemindars to the house of Jhunku, presumably to assist in the inquiry, and afterwards sent a chaukidar to fetch the three suspected Dhanuks. In answer to the summons, about a dozen Dhanuks turned up with their women folk, making a great noise as they approached Jhunku s house They were armed with lathis, and evidently meant mischief Niaz Ahmad asked them the reason of this conduct, and one biria, who seems to have been the rangleader of the party, replied, "Jhunku wants to get us all sum We have come to see how he will do it ' Jhunku replied "Why should I have you summoned? Those who are the theres will be chalaned." The head constable added, "Dut I make a noise, justice will be done? "How will justice be done?" rephed Siria, "we will get Jbunka summoned first." Saying this, Siria gave an old Dhanuk, who was standing beside him, a push with the result that the old man fell, striking his head against the chabutra The old man was Siria's father, Chimman by name, and was about sixty five years of age Several of the Dhanuks then cried out, "Kill the old man and accuse Jhunku," and

<sup>&</sup>lt;sup>1</sup> Kitt s Serious Crime in an Indian Province, 1887, pp. 14, 15 <sup>2</sup> Nis Ad Repls, N W. P., 1853, p. 765

several of them becan to strike the prostrate man. They seized the man by the legs and dragged burn fifteen paces away, and then Sura jumped The police and remindars appear to have made some mess ctual attempt at rescue The Phanuk tumbled the old fellow on to a charpoy and marched away in the direction of Meerut. There are two witnesses who state that they encountered the party on its way to Meerut and that the Dhanuks told them that Chimman had been as-aplied by linunky and that they were taking him to the police station. Chamman honever feelly protested from the charpos, saying that he had been as saulte I by the Dhanuks themselves, and that they wanted him to bring a false case seainst Jhunku By the time they reached Meerut old Chimman was dead and the Dhanuks charged Jhunku and several others with the murder saying that the reason for the crime was that Shunku and the police had demanded money from them in connection with the theft case, that they had refused, saving that they had none, that Chimman had expostulated, and that for this he had been done to death with lathis. The magistrate and the judge both disbelieved the story of the defence and believed the story told by the police and the remindars. The magistrate characterized the crime as most strange, unnatural, and revolting and the judge agreed with him. He sentenced Siris to be hanged three others to be transported for life for the murder, besides finding them guilty of fabricating cyclence against Thunku, with the intention of causing him to be convicted of murder. He found six more Dhanuks guilty of abetment of the second crume and sentenced them to various terms of impresonment - Allahabad High Court, JJ knox and Blair, 1902

( 4se -(b) Murdering adult brother -On the morning of the 17th December, 1901, the decemtated body of one Tabal Sunch was found in the field of Pertap Suigh in the Gurdaspur district of the Punjab Susy icion was at first directed against Pertap Singh, but the police were able to discover that on the night of the murder the deceased had been last seen in the company of certain persons including his own brother and the lumbadar of the village going towards the field where the body was found next morning It also transpired, ' we quote the words of the police report, "that on the 16th December the murdered man and his brother Mahal Singh were drawing at a liquor shop in Nowsbers, and there the murdered man, who was rather intoxicated, invited certain friends to drink with him saving it was the last opportunity they would have, as he would soon be in two or four pieces The brothers then went to Lotla where the other accused were assembled, and had more drink " By the advice of the public prosecutor a pardon was offered to the brother of the murdered man and his story was as follows -" He, his brother, Tahal bingh, and the lumbadar, were great friends, and they had a common enemy in one Pertap Singh of Bulewal, between whom and themselves there had been a considerable amount of higation. At the time of the murder Pertsp Singh had brought a charge of assault against him and his murdered brother (Tahal Singh), and Pertap Singh's son had a similar charge pending against the lumbalar. They arranged that Takak thingh should be murbered, his body put in Teriap Singu's field and a charge of murder brought against him Tabal bingh con sented to be killed for this purpose of revenge On the night in question the party proceeded after a drinking bout to Pertap bingh's field, the lumbadar carrying a gandasa On arriving at the field accused No 1 threw Tahal Singh down, and he and the lumbadar gave their super fluous clothes to accused No 5 to hold The lumbadar then sezzed the murdered man by the hair, while he himself and Bela bingh, accored No 4, each serred a leg Budha Singh, accused No 1, decapitated the cleased with the gandata. All then went to kotla where they washed their hands and feet at a well and burned some of the murlered mans rothers in the lumbudar a courtyard "The gandata belonged to accused No 1 and was found in his house by the police -CMG, 11th 1 oby, 1990.

Case -(c) Butcher murders his child to please paramour -In June. 1901, before the Allahaba I High Court, Mula a butcher of the sweeper easte, resident of moballa Namandi Rekabgani Agra was convicted for the murder of his daughter, a child of four years of age. According to the evidence and the confession of the accused. Mula had had an intimacy with Musamat Loka, a sweeper and used to live at her house Shortly before the murder took place hole left Mula and went back to live with her own husband This seems to have put Mula into a state of fury, and he threatened to cut off the woman's nose. On the night before the murder he visited her and during his visit struck the woman's year old chill According to hoka, the man threatened to kill the child woman got into a race and cried out Why should you kill her you give her neither food nor drink, why don't you kill your own child? ing to the accused the woman asked for the body of his own child. Mula went away and slept in his own house that night. In the morning he took his daughter to the slaughter house where he was employed as a butcher, an I cut the child a throat in the manner animals are al inghtered The man then took the body of the little girl to the house of hoka and entered the room in which she and her hust and were sleeping. Before awaking Musamat hoka he laid the body of the girl on a bed on which hokas husband and hokas son were sleeping. He then roused the woman and asked her to give him a smoke saving (101 knows whether I shall live or dic. She pointed out the tobacco at the fireplace brought fire from the fireplace and prepared his chilum He then asked the husband to smoke, addressing him in the same words, and the husband waking up, asked what was the matter He showed him the body lying on the charges and said he had killed the child at the bilding of hoka

Self-nurder in revenge.—Cases are sometimes met with mythich an individual who has been injured by another kills himself under the idea that he thereby throws the responsibility for his death on the person who has injured him. Instances quoted by Chevers show that, under the name of 'chand: this form of suicide was a well-known custom among the ancient Ruputs. A variety of this description of suicide is the practice known as sitting 'dharna' or starving himself at the door of an enemy or debtor. Again, Chevers mentions a case of a man at Singapur who cut his throat at the door of his neighbour in order to try to get the latter hunged.

Parents sometimes conceal the murder of their son or daughter, and report the death as being due to attack by wild beasts or suicide. So common is this moral insensibility to natural ties that the High Court refers to it as "instances of persons consenting to forego the prosecution of those who have

<sup>1</sup> Beng. Police Rept , 1819, p 8

committed the most serious injuries to their persons or proper ties are within the common experience of every magnitrate in this country" 1

## Some Special Causes of Crime in India.

A good deal of the crime against the person in India is the result of the primitive social state of the mass of the people and the observance of semi-bat berone cults and traditions handed down from the past and often based upon primitive tribal instincts of self preservation but which now under British rule are illegal and criminal

Traditional Customs.- Many such practices which nows days under British rule are crimes were not deemed to be such under Hindu and Mohammedan rule Instances of these are the burning of widows alive on the funeral pyre, female infanticide, burial of lepers alive, 'justifiable suicide', condonable murder or manslaughter (see below), and avenging certain wrongs, eg adultery, by taking the law into ones own hands In ancient India the avenging of all criminal justice remained in the hands of those who were wronged and still to the present day it is not fully recognized that the enactments under British rule have diminished the sphere of private revenge. Mutilation of nearly every part of the body was authorized as a numehment in Hindu law. Thus the hand or foot, both hands one hand and one foot, both hands and both feet, buttock, hp, penis testicles pudenda, rectum, cars, nose, breaking the teeth, finger or fingers, piercing or gouging out the eyes, etc, were specified punishments Burial alice was a recognized Mohammedan torture and Hindu sacrifice is still sometimes practised even nowadays Torture is still believed to be often resorted to clandestinely by the police to exact evidence, and trial by ordeal is still not infrequent

In the Veilas the serme of manglaughter (Varra kaiyı) was condened on payment of the price or blood money terme I Varra, payalab to the relative of the man killed. The scale of payment prescribed was 1000 for Surva and 10 for a supposed was the Institute of the Surva and 10 for a Surva and 10 for a supposed was the permute of the surva and so the supposed was the permute of the surva for this pudent interesting as any whole could not be explained to the most for a first force as any when even long to explain the performance of the top of the survailed and defendant but also the arbitrator — Veila India, Macdonell and Keit's 1912, 1, 311, 391, 393

<sup>\*</sup> Nor Ad Repts , Vol VI (1856), p 801

Tive kinds of suicide are considered justifiable by Hindus It is written in the Brakima Furana "Let the man who is afflicted with a gnerous and incurable disease enter a burning hre, or procure his death by starvation, or by plunging into unfathonable naters, or by precipitating himself from an eminence, or by according to paradise by a respectful pigrimage to the Himalaya Mountains Whoever relimpushes life under these circumstances, by precipitating himself from the sacred usfa tree at Frayaga, or, his time being come, destroys himself, that high minded person shall receive a great reward in a future state, and shall not be considered a suicide, even although the might have been a great sinner, he shall meet with supreme bliss in paradisc. The privilege of practising the above named austerities is extended to the human species in general, without restriction either in regard to sex or tribe—Macnaughten, Nrz. 1d. 1 pp 230-1

Cases -(a) Intentional live-burnal of wife -In 1907, in the Betul district of the Central Provinces, in the case of a man, Dama, charged with the murder of his wife, it was proved that the wife, Indro, had been for a long time suffering from chronic disentery and on 29th January. 1907, the woman's husband Dama the accused took her and the family away to another village, where he abandoned his sick wife and returned home with his children, and stated that he had left his wife with a bhagat or exercist for treatment. The village authorities sent the poor woman to another village where the husband was sent for, and his wife made over to him, and a cart and bullocks lent him to take her to his home. The accused took the cart, but came back the same day saving that the wife had died on the way and he had buried her. He was ordered to go and report the death to the hotuar he made no such report, but returned to his own village, and there stated that his wife was alive and under treatment of the bhanat On the sixth day after the alleged death of the woman a villager saw something move in the jungle, and his cattle shied when they went near the place The next day this villager told the Kotuar of this strange incident, and they went and found the mysterious grave, with the leg of a woman clearly visible. They then heard the buried woman say, "I am not dead, and she then told the Kotuar that her husband had buried her. The woman's brother in law and daughter were sent for, and they lifted the buried woman out of the rough grave and gave her food She was sent to the Badnur hospital and lived on for some twelve days longer The extraordinary part of the story, apart from the callousness and superstition of the husband, is the fact that the poor woman must have lain in the shallow grave, covered with leaves and branches, for six or seven days without food or water The accused was sentenced to transportation for life -King Emperor v. Dama Gaiki, 802 P C , 1907

(5) Trail by ordeal —In 1900, in a village in Madras, a shoe was lost and the village magician was commissioned to discover the thre! He distributed some powders to the assembled villagers, and immediately after eating the powders two boys were seried with violent vennting and one of them ded. From his viscera three grains of corrosive sublimate were extracted—Mad J.D. Rept, 1800, p. 8

In Burma, a short spell of organized robbery with assault ('dacoty') and even murder is still fashonable amongst the youth of that country to prove their daring and manhood to their sweethearts, and is thus from its audacious motive to be

distinguished from ordinary crime though it might be classed with professional crime

Intoxicants — The relatively milder type of the average criminal is perhips in some measure due to the relative infrequency of alcoholic drunkenness amongst Indians as alcoholism is found to contribute so largely to bereditary crime in Furope. Amongst the Burmese where spirits are more freely indulyed in murderous assaults even on near relatives are not uncommon under the influence of alcohol in Rangoon alone over 300 sword cuts of the head occur annually many of them fatal. But the intoxicant mostly indulged in by criminal Indians is Indian Hemp which accounts for some of the most violent tragedies such as running amol and other mannacal crimes.

Race and Environments — In s large a continent as India comparising so many diverse physical features climated and mees with different seoral and religious customs it is to be expected that s me of the crimes against the person and the mode of committing them slould differ somewhat in character in different parts of the country and be determined to some

extent by the different environments of the people

The softer and less virile people of the enervating plains wreak their stite or vengeance less by personal assaults than by false charges and sultle poison or afraid of bodily risk themselves they have ruffians to beat or murder their openy and scheme deeply to hide their crime whilst the hardier up-country people and hillmen taking the law into their own hands attack openly and slay with their own hands regardless of personal risk or blame and are less cunning in concealing their crime. The wilder tril caman lies in wait for the person he believes to have wronged or bewitched him and on killing his victim he makes little attempt to hide tle boly and usually admits his guilt at once Certain crimes are confined to certain tribes or castes such as the poisoning of cattle especially by abrus-seed needles ( sur ) which is done by the chamar or leather worker caste with the object of getting cheap I ides for their stock in trade

Religion is responsible for several kinds of crime in India. Those sate murders perpetrated in the name of religion in which Hin'lu widows are induced to immolate themselves on the faueral pyre or grave of their hashands still occasionally occur nearly every year In 1901 and 1905 cases occurred at Gay although it is over eighty years since sate was declared illegal by the British Government! Special police

<sup>1</sup> The law against the self-immediation of w dows was passed by Lord William Bentunck in 1873

precautions have yet to be taken every year to prevent Hindus committing suicide by throwing themselves under the wheels of the idol car of the god Jagarnath Temale infanticide on account of the religious and social difficulties of marrying daughters still occurs to some extent, especially in Upper India Abortion and child murder are most common amongst the unfortunate class of young Handa widows for whom re marriage and social rights are denied by their religion Amongst Mohammedans sexual crimes are much more frequent than amongst Hindus. Prostitution is much more extensively practised amongst the former and sexual jealousy resulting in the murder of paramours and favoured rivals is probably the most frequent case of homicule amongst Mohammedans In Bengal, for example, the greatest number of rape cases are reported from the Mohammedan districts of Mymensingh and Dacca That fanatical form of homicidal insanity running amok' is more common amongst Mohammedan fanatics than Hindus

Domestic chracteristics are that women, perhaps more so than in Lurope employ poison rather than bodily violence, and their crime is directed for the most part against their husband, or some rival in his affections, also that domestic quarrels over trifling matters are a frequent crime of squiede in India

Famine.—Under the stress of hunger in years of famine and scarcity there is a marked increase in such crimes as robbery by violence, and poisoning, homicidal and suicidal

The foregoing account of the special features of Indian erime, it is hoped, may facilitate our study of Indian Medical Jureprudence, the wide field of which can be conveniently yiewed under the following divisions —

I - I ORENSIC MLDICINE	CHAP
Identification of Persons, Laving and Deal	Y
General I xamination of the Laving in Criminal Cases	ıί
, Dead , ,	ш
Assaults, Wounds, Injuries and Deaths by Violence	
Non sexual General and Special Wounds and Injuries	IV
Homicidal v Suicidal and Self inflicted Wounds	v
Blood Stains etc	VI
Asphysial Deaths Suffocation Hanging, Strangling Drowning ) Burns, Scalds Lightning Stroke, etc	VII
Burns, Scalds Lightning Stroke, etc	VIII
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31 (	CRIMIT DELLCTION IN INDIA	
I-FORI \SIG	WrDICINL-continuel	CHAP
In trees	end Assaults Sexual Crivics and Offences	
	dence and Sterility	1
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Corrosin	e an l Irritant Miner il I oisons	ZZIII
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	Metallie	ZZZ
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\erve I	un s Cerebral Lonsons	27/111
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### PART I

# GENERAL EXAMINATIONS.

CHAPTLR I

16 water que e

# IDENTIFICATION OF PERSONS, LIVING AND DEAD.

THE personal identity of the individual in question must be ascertinized in all cases which are reported on medico-legally. The medical jurist may also be called upon to establish the identity of a person in cases of suspected foul play resulting in death, and in a great variety of cases, such as alleged assault, rape, disputed sex, fraudulent personation for the purpose of securing property or the prolongation of a lapsed pension, a fraud which is identifiated in this country by the seclusive

rights of pardah nashin claimed by married women. Of dead bodies in India it is especially difficult at times to determine the identity, owing to their rapid decomposition by the heat, and their liability to deficement when exposed to the ravages of beasts and birds of prey. On the other hand, the necessity for thorough identification is here all the greater, owing to the custom of rapid burnal and cremation, and the occasional practice of supporting a false accusation of murder by causing a person to disappear for a time and bringing forward when meanwhile as the body of the missing individual a putrid corpse readily procurable from any river.

In the routine examination of ordinary medico-legal cases, it is always well to get the identity of the person or body in question attested by at least two acquaintances, whose name or names should be noted by you in your record, as the personal identity of the individual examined is of such legal importance

Identification may thus be required of (a) a living person, (b) a dead body, (c) fragmentary human remains, or (d) bones only For this purpose you consider (1) the sex, (2)

age (p 41) (3) race and caste (p 48) and (4) any characteristic personal marks or peculiarities (p 53)

## Sex

The determination of sex is not usually difficult, as meer inspection of the external genital organs is sufficient to settle most crees otherwise doubtful without resorting to medical oxidence. In cases however of suspected murder, where the body is mutilated or only part of it or of the skeleton is valiable for examination and in the rare instances of doubtful sex due to unafformations where succession to property is concerned it becomes a much more difficult question, requiring expert exidence as in under noted cases. The question of sexual capacity and development also arises sometimes in alleved rate impotence etc.

Cass...(a) Pseudo hermsphred to Leri Suydum Suydum presented hard as freeman and the entitle to vote me contested election. The contested of the contested of the contested of the contested of the many contested of the contested

- (b) #t fifty five at leath General configuration that of a woman (during life celebrated anatomists had forme! infirent opinions as to the sext) the post morter there were found on the right side a withered testicle a puns and a prostate glan! and on the left an ovary uterns vaging and fallopian tube. Tulys Log UC I Sig case 123
- (c) Female as mate.—I rofessor A Towell (Bombay) reports that while he was fix-aden in Royal Hospital Belfast a coal porter named form while the season of the season of the season while the season while had always worked as a porter or dock labourer and had been marnel for two years. He was found to be a soman with normal vagins and ovaries but a very large chitons. It the imposs after 'his death has wife deposed that she had no suspacion be was a woman.
- (d) 'A person affected with hypospadias was married for twenty years and during all that time was treated as a female Seconal infer course was regularly effected by the cannot of the methra nor was it until the period just mentioned had elapsed that it was discovered that it is individual was a man — Ogston Ved Jur Leet p S.

(c) Male as female —In 1905, Dr. W. Hind reported case of "Miss V, agel 37, who had two sold ingunal tumours, which she naked to be rumored on account of their having become punful through the prolonged standing her occupation involved, and the microscope revealed a testicular structure in both. She was 5 ft 1 ms in height, and 8 st 1 lbs weight, and feminium in appearance and habits, soft vione, with long hair, none on face, well developed breasts, female external genitalia, but no vaguan. She never menstruated, and has four susters like hervelf, who have no trace of a vagina and have never menstruated —Trans Med Leg Soc., 11 117

A remarkable instance of concerled sex was the case of Di Junes Barry, an army surgeon, who rose to the rank of Inspector-General of Hospitals, and after death was discovered to be a female

Sex of the Living.—This quistion may arre in connections with malformed infants where property is left to an heir of a figerial sex, though what is the characteristic in law of a male, is open to discussion

Thus in entailed property with succession in the male line if a known with no son but a daughter marres aguin and has only a k daughter, his property would be divided equally between the two Adaughters, indies a male chil had leen born to either wife when even if it lived only half a minute the whole of the property would go to the sister of this male infant as here if her bottom try other property.

At a later age this question may occur with reference to malformed individuals as to their (1) education whether as a boy or girl, (2) marriage as a man or woman, or (3) right to yote as a man

In such cases the sex may be very difficult to determine No definite rules can be laid down, tack case must be decided on its own merits, following the legal rule that the individual is to be of that sex which most predominates

### Essential tests of sex in adults -These are-

V 1 Possession of a testigle accompanied by emissions of fluid containing spermitozoa—that is the strongest possible evidence of a male (but see case of Catherine Hohmann, p. 39)

2 Possession of an otary accompanied by periodic hæmorrhages from an opening about the genitals is the strongest ovidence of a female. The uterus vigina and breasts are merely incidental appendages

y 3 In the absence of the above two characters, the presence of a uturus or a second opening behind that leading into the bladder indicates a female.

4 The general configuration of the body when it agrees with these local indications may be considere I confirm itory evidence, but if it disagrees it should be distremulad

Local examination should include, as far as possible, the internal genitals by himanual and rectal pulpation if necessary

In infants a consideration of the morphology and develop ment of the sexual organs is of assistance as these almormalities are due to faulty development in the feetal stage during the differentiation of the series

In the normal female there is so to say an arrest of development in the middle line below the genital tubercle or clitoris the homologue of the glans pones thus forming the entrance to the vagura and the lateral cutaneous folls do not coalesce but remain separate and form the labia majora. In the normal male the genital folds meet and coalesce in the middle line below to form the scrotum and corpora spongiosa and caver nosa and above to close over the urethra as far as the glans to form the tens If the genital folds do not unite the crethra of the male remains open constituting hypospaders, which simulates to some extent the female organs especially if the testicles have not descended. If in the female there be excessive i steral union and growth of the clitoris the con dition may stimulate the 1 ale

The chief homologous arts in the male and female are -

Male Glans penis Prej uce Scrotum Sinus pocularis Las deferens Guhernaculi .n te s

Citons Avmohæ Labia maiora Literus Ducts of Gaertner Round ligament Overs

I emale

The abnormal variations arising from faults development in these organs which may mask the sex are divisible into -

Testiele

True Where the internal sexual organs of both sexes
Hermiphrodites are present
[Where the abnormalities are confined to the

external organs -

Hermaphrodites Androgyne or womanly men whose male or Fende Hermaphredites Androgyne, or manly women, whose female Androgyne, or manly women, whose female of gans re-emble the male

Androgym have as the most common condition hypospadius, so called from the wrethra opening below the small imperforate penis. In rpispadias there is dehesency of the anterior wall of the bladder, so that the ureters open externally above the short imperiorate pems. In both of these conditions the testicles may not have descended or may exist as a tumour in the groin (ergy torchid) In An Irogynor it is usually a case of enlarged chloris with a prolapsel uterus, the fisture of which is transverse, whist that of the joins is tortical in such cases, if menstruction is found, it is a female, if a testicle or seminal emissions,

"True" Hermaphroditis—The old myth attributed to these beings the possession of organs of both sexes with the power of self reproduction No individual with such powers has ever been known to exist. This name, however, is still applied to those individuals who possess certains of the gential organs of both sexes. In the remarkable case of Catherine Holmann, she brid the sexeal instincts both of a male and a female, she inenstruated periodic silv and had seminal emissions containing sperma tozona (Seco lais Case h. p. 30)

This is called 'true hermaphrodism has been divided by Sir I X. Simpson' into Lateral "Testicle on one said and cray on the other Transvers. —External organs invite and internal female or the reversal Vertical or double, of three varieties—(a) Ovaries with combined male and 'fridial' passages, (c) Testicles with combined male passages, (c) Ovaries and testicles co custing on one or both sides The 'Interal a considered by Watson to be the only true kind of hermaphrodism, while (c) ought probably to be classed amongst double monsters

In addition to the local examination the following general characteristics should be considered —

General sexual characters in adult -

- 1 General configuration of the body The shoulders are generally less wide than the hips in females, the reverse in males The breasts much more developed in females
- 2. Hairiness of face and pubes after puberty is greatest in males
- 3 Voice is deeper in tone in male and the pomum Adimi more prominent
- 4 Sexual instinct is assumed to be towards the opposite sex, although there are recorded instances of sexual indulgence of an inverted character (see 'Sodomy, Chap \\II, Unnatural Crimes)

Sex of the Dead.—When the entire body is available for examination there will be no difficulty in the great majority of eases in determining the sex, and in doubtful cases of milliorined organs dissection will at once reveal the true sex. Any question with regard to the sex of a dead body usually arises when only mutilated fragments of a body or only bones are available for examination. For the identification of such bones the text-books on general anatomy should be consulted

Sexual characteristics of the skeleton in the female -

- 1 The bones are smaller, thinner, and lighter, and muscular attach ments less prominent than in the male
- 2 The priors is shallour and wider than in the male, which is deeper and narrower. The illum is more expanded, sacrum more concave than the male (where it is straighter), the symphysis short public arch wider, with edges more diverted, foramina more transplar and outlets larger than in the male.
  - 3 The ribs have a greater curvature than m the male
  - <sup>4</sup> Med Times and Gaz, June 23 1873, and Am Journ Obstetrics, 1876, p 615 \* Todd's Cyclop of Analomy

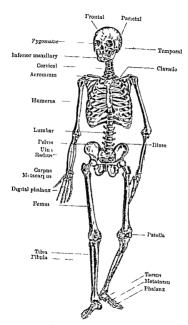
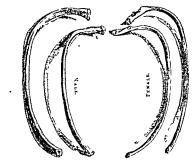


Fig 1 -- Human Male Skeleton



1 10 2 -Curvature of 1 emale Rib : Male

The average measurement of the bones (see  $\Gamma_{i,g}$  1) in each sex, for Europeans, are here detailed —

## MEASUREMENTS OF BONES AT DIFFERENT AGES (IN INCHES) !

***************************************												
					ŀ						iei	yis.
Age		Beget	Alme	Circumference of sku t	Komerus	Lad &	Hend	Femur	Tible	Foot	frameter of	Antero-per-
At birth		19	70	150	3.5	25	31	43	85	8.5	13	18
2 years (aver-	age)	27	85	17 7	47	86	8 1	62	51	36	22	22
4 to 6 years f	average)	185	118	180	66	48	41	91	71	51	25	25
8 to 12 years	(average)	43	128	188	83	€ 0	51	11 4	94	64	8 1	3.1
	( Temale	55	17 0	190	108	70	58	148	110	78	40	86
15 years	Male	54	16.5	190	105	75	56	150	11 5	-	_	
•	Iverage	54	16 6	198	10 4	7 4	57	148	116	80.	88	36
	[Female	59	190	195	110	82	6.5	160	128	80	50	48
18 to 19 years	Male	59	17 5	20 4	110	8.5	63	150	180	80	89	88
	\verage.		18 5	198	11 4	86	66	15 5	13 3	83	47	45
Adult Lurope	an (aver	1		ĺ					i			
age)	•	65	222	20 5	127	92	73	17 89	114	106	62	43
		1 :			1							

1 From Dr Humphrey, The Human Sheleton

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#### Age

The determination of age may be required for the identification of an individual living or dead as well as for the question of criminal or evil responsit hith in regard to marriage, fecundity rape viability in relation to infanticide making wills capribility as a witness, coupleyment under the lindim hactory Act etc

Age in criminal responsibility -Children under the sice of seven are deemed meanable of committing an offence Chil lren between the ages of seven and twelve in India (seven and fourteen in Fn land) are only deemed capable of committing offences if they have attained a certain degree of maturity of understanding (I P Code as 82, 83) Sexual intercourse with a girl under the age of twelve in India is rape even if the girl consents or is the individual a own wife (I P Code s 377, see also Rape ) In England sexual intercourse with consent is a felony up to the age of thirteen, and between the ages of thirteen and sixteen 13a mis lemeanour and punishable as such 1 In India however the law is in practice assimilated to that of Figland by the prosecution when failing to prove a child to be under 12 often indicting the accused under \$ 361 I P O for enticing or hidnapting or under s 73 for buying living or otherwise obtaining for prostitution or any unlawful or immoral purpose or under \$ 373 for selling letting to hire or otherwise disposing of any minor under sixteen which make connection with a girl under sixteen an offence and then the surgeon has to inquire whether the girl be under or over sixteen Only a person over the age of twelve can give a valid consent to suffer any harm which may result from an act done in good faith and for the sufferer's benefit (I P C s 90) and in cases where the act does not come within this description the consenting individual must be at the age of eighteen or more for his consent to be valid (I P C s 87)

Age-capacity to contract marriage —According to the law of England finales under the age of twelve and maks under the age of fourteen, cannot contract marriage. In India consummation of marriage is illegal under the age of twelve, we above

Attainment of majority—In Figland majority is attained at twenty-one Persons under this age are minor. A minor cannot make a valid will cannot alienate his goods by deed cannot be called upon to serve on a jury, etc. Certain

<sup>\*</sup> Ora smal Law Amendment Act 1835 (49 Å 49 Vict e 69) Section 7 of the Act also makes it an offence to abd et an inmarr ed girl under eighteen with intent that she should be unlawfully and carnally known by any ma

cases excepted persons domiciled in Butish India attain majority on completion of their eighteenth year, except when under a guardian appointed by a court or under a Court of Wards, when the individual does not attain majority until completion of twenty one years of age (Act IX of 1875 s. 3) Legally an individual attains a given igo on the first minute of the day before his birthday eg an individual in Ingland who popularly speaking will be twenty one on the 3rd of May, will legally coase to be a minor at the end of the last minute of the last of the l

Eligibility for employment under the Indian Factory Act—In Fu<sub>0</sub>land in factories children under eight may not be employed and children between eight and thirteen may only be employed for six and a half hours per day, and only males and females between thirteen and eighteen may be employed for sixty hours per week. The Indian Factories Act (XV of 1881) provides that in fuctories coming under its operation no child under the age, of seven shall be employed and that children between the ages of seven and twelve shall not be employed for more than nine hours per day and shall have one hour daily for rest and four holidays per month

## Mode of Estimating Age

The chief data for estimating the age of an individual are—
(1) the teeth (2) height and weight (3) hair and breast development (4) degenerative changes (5) extent of essilication

In the Living, ago can only be estimated with any degree of certainty in the young. After adult life is reached the ago is only to be guessed at approximately in the absence of regular certificate of birth or a horoscope. The points to be noted are.

(1) Teeth—These yield indications of age up till the thirteenth or fourteenth year, and with the wisdom teeth up to the eighteenth year. The temporary or milk teeth usually appear in the following order—

TIMPORARY OR MILI TEFTH PREPRIOR Eruptive Order \ame Age 1 Lower central lucisors 6th to 7th month Upper 7th to 8th 3 Upper lateral "th to 9th Lower 10th to 12th ly my 5 1st temporary molars 12th to 14th

17th to 18th

2nd year (often later) \_2{ 26

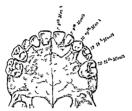
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Canines

2nd temporary molars

In certain world; children, especially those suffering from rickets the dentition may be delayed, while in syphilis the teeth may be premature and even present when the child is born



Fix 3 -Temporary Teeth (upper saw) !

The Permanent Teeth are thirty two in number 16 in each jaw. He following table by Irofessor 1 lowell while the police-engeen of Bomlas gives the order of their appearance for India according to a very large series of observations by him 2.

	Powell fr nava f inda.	facuders	i edjev	Smr	4 ann
		ţ	_	****	
	Trut	year.	year	Trat	7 47
Tirst moiar	oth to "th	Sth	fth	7th	7th
(entral inc or	7th	≀th	"tb	7th	8th
Lateral	6th to 3th	wh	8th	5th	9th
Car ine	10th to 13th	13th	11th to 12th	11th to 10th	11th to 13th
At terior pre					
molars or	1	f			Ī
b eu-4 td	Jth to 10th	11th	Sth	9th	10th
Losterier 1 re					
molars	10th to 12th	1941	10th	10t3	11th to 15th
Secor d molar	11th to 19th	13th to 15th	1 tb	19th to 19th	13th to 1fth
Wadom			1"th to 25th		

In natives of India a few exceptions may be found to these figures but these exceptions will be found on the precocious side rively at later dates

Generally, a child of nine should have 12 permanent teeth, at ten or eleven 24, at thirtoen or fourteen he will have 28

<sup>1</sup> From Macalister's Himan Anatom ; I M G 1900 p 030

In a case at Chingleput Madris! the age was decided wrongly to be between twelve and thirteen because the perminent second molar teeth were ready to come through. In advanced

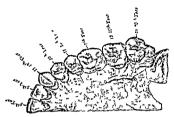


Fig 4 - Permanent Tooth 2

life the teeth become worn down and discoloured and more or less are lost

Dr Powell notes that —The first molus appear with great regularity in the auth or seventh, per Of forty on children aced seven all had their first permanent molus —The cittad inci ors appear during the seventh, the lateral at the eighth or mith year. Ull non-year old children natives Jews and Parsi hid ill the incisors permanent of the fluctuations aged nine one girl had not shed her lateral mill incisors. The canines showed greater variation in the time of cruption. They usually appear during the elected nor twichth year. I have seen permanent canines in a child of nine. The anter or bicuspids appear in the ninth or tenth the post-time from the tenth to the twichth year. The second molurs come with great regularity in the electenth or twelfth year. They may appear earlier that I have seen seen a Hindu or Massidians child of fueles without second molars. I have seen wis lost testing the second molars of the second molars of the second molars of the second molars. I have seen wis lost testing the molar of the second molars of these seen through the second molars. I have seen wis lost testing that the second molars of the second molars of these second molars. I have seen wis lost testing the molar of the second molars of these second molars of these second molars of the second molars. I have seen wis lost testing the molar of the second molars of the second molars of the second molars. I have seen wis lost testing the molar of the second molars of the secon

To distinguish the permanent from the deciduous or tem porary teeth is not always easy Professor Powell gives the following directions —

Taylor says the milk teeth are smaller than those that replace them to set the surgeon to compare? This is not true of the decideous molars. These are usually larger than the bicuspids which replace them

J Short Madras J Med Sc 18(2 p. From Macalister's Human Anatomy

The anterior milk teelt are vertical the permanent are usually inchined somewint fragang! The corous of the milk teeth aro of a white china like colour as conjugated with the avery white of the permanent. The punction of the crown with the fang of the milk took is often marked by a ridge which is not seen in the permanent. 'Mercural' teeth and Hutchinson's teeth must be of the permanents set

2 Height and weight—There are no special Indian observations on the relations of height and weight to age. The tollowing table is based on data in England where the average height is slightly more than in India.

	Males,			len ales.	
Acr last better by 10 to	Males.    Control   Contro	10 7	Arc last 10 10 10 10 10 10 10 10 10 10 10 10 10	11dg 1	Nelgin   N

The weight slightly diminishes in oil age. Fighth children attain hall their adult weight at about 12 in case of boxs and under 11 in case of grib, as in this table 1

	Me	lea .	} em	} emsles	
8 years 9 10 11 12	Height in toches 46 65 49 21 51 00 52 87 54 05	Weight to the. 55 08 60 02 65 29 71 01 75 00	Height in 1 ct es 46 73 48 63 50 07 53 66 54 41	Weight to the 52 82 56 53 61 19 65 00 75 95	

<sup>1</sup> Dr Bridges Vimo on prison diels, calculated from children in non factors districts

The average weight of Indian children at birth has been estimated at 51 lbs 1, that of Lnglish children at birth at 61 lbs, and during the first year after birth about one pound is gained each month 2. Of adults the average height and weight in the na joint of Indian iaces is lower than that of Turopeans. Buchanan gives the average weight of a Bengali ti 109 lbs. Lewis gives under 110 lbs as the average weight of N-W Provinces min. Luchanans formula for calculating the weight for the height is Taking 5 fact as equal to 100 lbs, add 3 lbs in weight for every full linehabove that eg 5 ft 6 in = 100 + 3 × 6 = 118 lbs. In men over 5 ft 8 in add 4 lbs for each inch

lor Europeans — Average height without shoes and average weight, with clothes of all classes (town an i country) of the general population of Great Britain (from the report of the Anthropometra Committee, 1883). This table shows, (1) torouth is most rapid during, the first five years of life the rate of growth being abubt the same in both seves guits being a little shorter and lighter than boxs (2) from 5 till 10, bors grow more rapid by than gurls (1) from 10 to 1 r gurls grow more rapid than boxs. 4 till 4 to 11, tho, are not utill, it aller and from 121 to 15 actually heavier than boxs. 4) from 15 to 20 boys begin again to increase more rapid the might and wondpict, their growth at about 23 (5) After 15 gurls grow more slowly and r gractically reach their full height and weight at 20 During child flood and a tolescence increase in weight is more marked in the winter and increase in height in the summer.

3 Hair on putes and armpits. This growth begins about ten or cleven years of age, and in boys about filteen to eighteen is attended by deepening of voice.

n<sub>l</sub> 4 Breast development in first —This varies greatly in time. In native girls the average age of puberty is twelve to thirteen (see Chap AI). But even women of twenty sometimes have not menstraated, and Dr. Powell cites a crist of a child, aged four, who had a dischirge of blood from the vagina every six or eight weeks and the labia were large and the breasts as large as the halves of a moderate size orange. It is accepted as a good defence in Tingland in cases of alleged tape when consent is admitted or proved that the judge or jury is satisfied that the girl looks sixteen and might have been supposed by the accused to be sixteen years of age irrespective of her actual age.

4 Degenerative changes—Wrinkles, grey hair, arcus senilis which is rare before torty, change in angle of the lower law. The angle of lower law, which is obtuse in infants, becomes

Harvey Loc cut 2 According to Tidy

nearly a right angle in young adults, and in advanced old age becomes again obtuse and shallow, through absorption of the alveolar portion

5 Ossification.—Although this is less easily and certainly observable in the living than in the dead, the Rondgen rays enable it to be observed in the former, and it is of especial importance in charges complementary of raps where the surgeon that to manyer whether the girl be under or over sixtem.

Tor points of Ossification see table. The criphysis at the line point unites at the sixteenth year and not the seventeenth to the twrity-fourth, as stated in the anatomy books! The external condyle 17th or 18th year, olecanon 16th year? Intend condyle 17th or 18th year, olecanon 16th year? Heat of the radius suries with the shaft shout the 18th to the 18th year. The centers of the accommon, the border and lower angle of the scapula, too in the cornound process appear between the ages of lorsteen and sexteen. These latter are difficult to observe by the News. The pusiform home in children over teelve unanly shows only the News are the second of the seco

Age in the Dead,—Here, in addition to the foregoing partial regarding dentition and height weight, it is possible to make more extensive use of an examination of the bones for that other precise criterion of age—the progress of ossification, as in Octsion table on next page

It should be noted that -

(1) Ossincation appears in the following cruphyses at the ages stated in y are Before the end of the 2nd in the heads and lower cruphyses of the humers, femur, and tibia, and in the lower criphyses of the ulna radius, and fibula 4t 5 in the upper cruphysis of the fibula, at 7 to 9 in the older man, and 8 to 10 in the upper cruphysis of the radius

(2) Ossification appears in the bodies of the following bones at the ages (etated in vears) At 2), patella at 3, cuboid at 4, trapezoul and second and third tarsal cunciform, at 5, semilurar and carpal scaphoid, and at 12 in the pistform bones

(3) Bony union takes place at one year, of the posterior arrives with the bodies of the virtlebre, and of the three protions of the temporal bone At 8 years, of the adouted process with the axis at 4 years, of the stylind process with the temporal bone at 6 years, of the ascending ram of the public at 9 years of the lines portions of the virtlebre, and of the coronacou with the springer at the public series of the public series of the prophyses have united, and at 25 to 30 the first seeml vertebra unites with the others.

(4) As age advances the rib and laryngeal cartilages become ossified

The above directions apply also to fragmentary portions of

1 Dr A Powell, loc cut

Dr Carl Beck, Journ 4mer Med Ass, 5th January, 1901 Quain Dr A Powell gives 16th to 17th year

a body or skeleton, in regard to which consult Dr. Humphrey's table on p. 41, from which the age may be approximately estimated from isolated bones.

THE PROCESS OF OSSIFICATION

Age after birth	I oints of evification appear in	ik yn ison occurs between
4 months 5	Cornua of I you I Cornucula of hyord Anterior arel of atlas	Alle majores and body of sphenoid
1 vear	Lower end of humerus heads of humerus femur and tibra 1st cunciform bones	I osterior arches and body of vertobre portions of the temporal bone except styloid process
2 усагч	Lower ends of ralius tibia and fibula ends of me tacarpal and metatarsal bones	· · -
21	Patella lesser tubero its of humerus and four smaller metacari al bones	_
3 4	Cuboid and large trocl anter Frapezoid 2nd and 3rd cuneiform	O lor told and axis Styloid process and temporal hone
5	Semilunar carpal scaphoid head of fibula erds of finger bones	Rami and body of vertebre dentata
6,	Proximal epiphyses of four smaller toes	Ramı of pubis and ischium
7 to 9 ,	Trochlea of humerus Olecrar on and scaphoid	The two bony points at head of humerus
9		Three portions of os innom: patum
12 14	Pisiform Neck and lesser trochanter of femur	Ξ.
15	Inferior angle of scapula.	Last 4 sacral vertehre cora
15 to 20	Sternal end of clavicle coccyx	Shaft of femur and its epi physes humerus and its epiphyses
18 to 23 ,	_	Sphenoid and occipital tibia and its epiphyses list and middle portions of ster num epiphyses and body of ribs
25 to 30	_	First sacral vertebra and rest of sacrum

## Race and Caste.

It is not often that this requires to be proved but the question might arise with reference to the dead bodies of unknown persons. Certain externals of dress and conventional

me	da	ns The chief of these are he	re to	abulated
-		Mohammedans.	T	Rindus
	/ <sup>1</sup>	Circumcision marks over 11 vesrs of age	1	Not circumcised
	2	Firs not pierced or only one	2.	Both ear lobes pierced
les	3		3	Hair tuft retained whe
	4	Callusties from prayer attitudes on forehead tip of 1 ext malicolus patella tuberosity of 1 t bia.	4	None
	5	Palm of I hand and tip of little fuger occasionally stained with lenna	5	Not so
	G	Chapkan coat fastened on left side of chest and may slow sunburnt mark	6	Chapkan opens on right side
	1	No sacred thread	7	Sacred thread in highe

1 Not tattooed e pecially between eyebrowa.
2 Ears pierced numerously along

helix with silver rings

8 Nose ring through septum

4 Shoe marks probable

5 Palm soles and mails tinted with brown lenna or nehindi 6 Sari worn double

7 Trousers usually? 8 No vermilion or hair parting

9 No tron wristlet

6 Sari worn single by married
except in E Bengal
7 No trousers.
8 Vermilish on hair parting in
married
9 Iron wristlet on left wrist in
married in Bongal

caste, over left shoulder

especially

I Tattoood between ever and

Nose rings through left ala

4 Shoes not worn toes wide spread

Stained with carmine aulti a

inside weist

2 Ears pierced in few places

lower castes

The best test of race is found in the measurements of the head and of these the easiest to take and one of the most important is the caphalic index. This is the ratio between the maximum length and miximum breadth of the shull thus maint insureries xi00 = Cephalic Index Askull is 'doltable cophalic' or 'long headed when this index is between 70 and 75.9, 'missiteephalie or 'medium' long headed from 70 to 70.9, and breaky-cephalic (the Mongoliru type) or 'round' headed from 80 upwards The shull of the fair Anyans and the dark aboriginal Drawidian tribes are both 'long or' medium long' remedian long'.

<sup>&</sup>lt;sup>2</sup> Except procelytized Bongali Mohammedans, <sup>3</sup> A Parai woman wears trousers and sacred thread around waist like male Parais

heuded, but in the case of the Anyan, or type in which the Anyan blood predominates, the long skull is broad-browed, whereas the Drividian, though also long and usually relatively longer than the Anyan is narrow browed. Thus, whilst Rajputs, Brahmans and Kayasts of Bengal have skulls with a cephalic index averaging respectively 76.7, 78.7, 78.2, and Dravidian tribes and castes average 74.8 to 78, in the former case the brow is broad, giving a wider skull with larger bruin in comparison to the narrow skull of less brain capicity of the Drividian and Dom

Racial differences in skeleton —Sir II. H. Charles, I M S, has shown that it is possible to differentiate Oriental from European skeletons by means of peculiarities in the writebral column, pelvis and lower extremities, the result of changes in the bones brought about by the different modes of sixting. The Oriental in India sits habitually in a squatting posture on the ground, or on a cushion, and not on a chair. His body, when thus seated, leans much more forward than in the cliair position of the West, and the effect of this habit during many centuries has been to cause an alteration in the bones.

The importance of being able to distinguish the skeleton of a European from an Indian may be useful at times, such as when a British soldier has disappeared from cantonments, and a skeleton is brought forward which is believed to be that of

the missing man

Spinal Column — As a rule the boly of a Punjab lumbar vertebra is thicker behind than in front—and as the type matins with age, the excess of the posterior over the anterior becomes more pronounced. In the female only is the anterior measurement greater than the posterior The total posterior diameter of the fire lumber vertebra. I have found exceeded the anterior by 10 mm in one case. Generally the difference is 8 mm in favour of the posterior. Amongst Luropean skeletons Sir William Turner states there is a variance of 5.6 mm in favour of the anterior surface. The 5th lumbar vertebra is only exceptionally weige shaped as in the European. Up to the age of 12 years none of the typical changes have taken place, and it is probable they occur in the epiphysial area, and that it progresses from pubert; to 25 years of age eventuating in the feet that the deepest part of the centrom of a lumbar vertebra is behind, and not as in the Furopean in front.

The lumbar curve is straight or very slightly convex. The mean general lumbar index of some recent vertebral columns I found to be 0568. Six Wim Turner quotes 90 as the index for the I'uropean lumbar curve. The accessory processes of the 5th lumbar are frequently very largely developed, and often articulate with the also for he sacrum.

<sup>&</sup>lt;sup>1</sup> The identification of Luropean and iOriental skeletons by Major i H Churles, i m s , Ind Med Congress Trans , Calcutta, 1891

The auricular surface of the sacrum I found in 787 per cent to be found of only two vertebrs, the first and second. European sagar have this surface forms i from three vertebrs, according to Professor Macalister

Acetabulum — Ist, in natives of India the ischial portion of the faces land as very large. The rum of the acetabulum here is very prominent, the groove for the obt rator external below it is consequently deep

2nd in the extension forwards and widening out of the lower from of the faces lunaris whereby the cotyloid notch is as it were partly bridged over instead of being an irregular own space. It looks as if the trans

verse ligament were ossified on its ischial side

Bod, the cotyloid notch which in the I uropean as innominatum is at a rule opin presents in all well marked Indian bones the characteristic of being arched over by the forward and upward prolongation of the inferior cornu of the facies innata. The superioral boundary of the cory loid notch in the I uropean consists of the transverse legament alone, the same boundary in the Indian consists of bone (part of the ischium) plus the transverse legament.

Head of the Femur—The articular area is of greater extent relatively and absolutely than that of an European bone. The surface is specially prolonged to a last itself to the mo lined facus lunata of the acctabulum during extreme fluxon and partial abduction and entreme adduction occurring in the hip joint in the equatting and satorial postures. The neck of the Femur is longer relatively than in the Europeau. The upper surface of the internal condyle of the femur is partly articular. This is not so in the Lunopeau where it is merely rough for the internal head of the gastrocarchias. It is due to the power of extreme flexion possessed by the Orental kines joint.

Head of the Tibus is set on the shall very obliquely. An Oriental this can be easily held by the finger and thum when the internal tuber outly is grasped behind by them. The upper surface of the internal tuber outly slope, so can lerably downwards and invaries, it is never flat as in the Duropean bone. The external tuberoutly of the tibus has its condylar surface convert from before backwards and the articular area is well prolonged downwards posteriorly. The upper part of the tibus disaphy as is commonly directed obliquely backwards. On the anterior margin of lower extremity of the tibus a facet will in the great majority of cases be found 71 per cent of tibus ea second facet on the same brider but occupying a more internal position will be seen. Both these articulate with corresponding articular areas on the upper surface of the pack of the Astrachills

The Astragaias contrasted with the I uropean differs considerably. The outer margin of the neck is much timiner than in the Furpean hone-markedls so. On the head there is a greater prolongation of the articular surface, both internally and externally relatively to the size of the bone, than in the European specimen. The under surface —In the T uropean bone the deep concavity or articulation, with the large course faced on the upper surface of the os calcins is bounded generally by two sharp non articular margins. In Oriental bones the outer margin is frequently articular on its inferior aspect as this part when the facet exists, articulates with the upper surface of the greater process of the os ealers

The Skuli.—For practical purposes it may be assumed that most male Indian skulls, certainly those of the lower casts, have a cubic capacity

of 1890 c o or under, whereas European male shalls run from 1600 c o and upwards. The measurement of the cranial cubic capacity is easily taken with mustard see i, which is procurable in any bazaar (though the use of smull shot, as in Lurope, is better, especially if the shull is not or duty]

Bones generally—Some points assigned by authorities as differen tiating I irropean and Asiatic skeletons are to be used with caution —

Ist.—The bones of the Orental are smaller. It is generally so, but ot always 2nd.—The skeleton of the Oriental is higher. An adult made Turopean skeleton weight about 10 ibs 6 or, the female weighing 8 lb. 18 or 2. A skeleton of a Laupal weighing 12 lbs 3 or is exceptional. The rule holds truer for fem ite skeletons. An average Panjabi female weighs about 6 lbs 2 or There is a genter difference in weight and stature between the Indian female and the Luropean female than there is between the males of these race.

Birth-mark as Test of Race -The presence of blue irregular patches on the lower sacral region of infants is alleged by Baelz to be exclusively found amongst persons of Mongolian rice. Extensive inquiry by the Indian Government during the census of 1911 eligited that the Mongoloid patch' is almost universal amongst the Burmese who are typically Mongolian-the colour is generally dark blue, but varied from dark brown or reddish to pink (Burma Cens Rept 1911, 285) It was fairly common in Assam Bengal the eastern border of the Upper Provinces and Panjab where a large leavening of Mongolian blood is known to exist. The Bombay Rept. from observations in maternity hospitals found the patches in Hindus 25 per cent in Bombay and 17 out of 19 in\_ Admedabad, Goanese nearly 20 per cent and infers that while it may be universal in Mongolian races, it is not confined to them exclusively

## Personal Marks or Peculiarities.

These may be congenital or acquired Those which admit of being photographed should be so registered

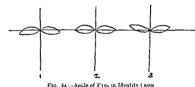
### ONGENITAL

These are chiefly the features, colour of the eyes, etc, deformities, and finger prints

1 Features.—Resemblance to parents or family likenesses or to photographic portraits of a missing individual may be important in the case of those claiming to be individuals who have not been heard of for years. In the case of dead bodies, juttefaction rapidly renders the features unrecognizable, in some instances, however, the features have been clearly recognized.

after long interment, eg. in the case of Charles I-, whose body was exhumed 165 years after death

Cases of Disputed Identity -(a) The Tichborne case -At the trial of this case in London in 1874 the main question was whether an individual who claimed large estates was or was not Roger Tichborne. Roger Tichborne was believed to have perished at sea twenty years previously Some of the witnesses expressed their belief that the claimant was really Roger Tichborne the majority, however, denied this, and believed he was Arthur Orton a butcher, of Wapping The following were some of the main points in the cases -(1) It was proved that Roger Tichborne had been bled repentedly from the arms, and once also from the ankles and temple, also that he had tattoe marks on the left arm. None of these marks were present on the boly of the claimant Comparison of the features of the claimant with a photographic portrait of the true Roger Tichborne showed the following differences (a) The eyes of Roger Tichborne tended upwards from the nove at more than a right angle, those of the claimant tended downwards and therefore at less than a right angle (see diagram, Fig 4a), (b) the ears of the



110 4k -- Million of 1 ) ca the since the case

ic No 2 the axes of the eyes form a right angle with a line drawn through the middle of the forebead and none. In No. 1 it is less than a right angle in No 3 more than a right angle

claimant were about one third longer than those of Roger Tichborne, (c) the central groove journey the nove to the upper tip was much wider in Roger Tichborne than in the claimant (7) The claimant was sequainted with many of the events in the life of the tire Roger Tichborne apparently picked up from various sources, he, however, (e) did not know the Christian names of Roger Tichborne's mother, and (6) could neither read nor speak Trench, although the true Roger Tichborne spoke French fluently i

(b) The Burdwan Case of Disputed Identity—Tratap Chandra—The case of Pratap Chandra, the claimant to the Burdwan Bay, resembled in many reaspots the foregoing Trublecens case. It was tried in 1838 at Hooghly The 1 μe of Burdwan at the beginning of last centary had an only sent, Pratap Chandra, who died in 1820, 1821, during the infetime of his father. Interen years afterwards, in 1820, a pretender interest to the control of the control of the property of the control of the property of

returned. His story gained considerable credence, and some of his adherents created a breach of the peace for which he was imprisoned for six months. On release from sail he was provided with funds by some of those who believed in him, and went in royal state with a large following to take forcible possession of the palace, causing a disturbance in the quelling of which three persons were shot by the military He was in dicted for fraudulently assuming the name and title of the deceased ring The death of the real Pratap Chandra was testified to by the native doctors who treated him and other persons who saw him die of fever, and who were with the corpse until it was cremated, also the priests who performed the stadh ceremonies The face of the corpse was uncovered and then touched with fire three or more times, and the fire having burned ... the corpse to ashes in the presence of two or three thousand speciators. it was impossible that the body could escape The identity of the claimant was rejected by Mr H T Prinsep, Secretary to the Government of India. and several others who had known the Pratap Chandra Whilst General Allard, Major Marshall, Dr Scott, Civil Surgeon of Burdwan, Dr. Halli day and others believed be was the real Pratap The prosecution alleged that he was kristo Lal, son of a priest, formerly resident of Burdwan Several witnesses testified to the claimant being the latter person, also the prisoner's voice and manner were quite different from those of Pratap. but his features, especially in the shape of the nose and the colour of the eyes, resembled a picture of Pratap Major Warshall identified him as Pratap by certain marks, though the nose of the young ria, twenty years before, was ' rather fuller and smoother, and the outline not so distinct" as the prisoner s at present The Danish Governor of Chinsurrah, who was well acquainted with Pratap, identified prisoner as the real prince by certain scars, namely, a slight mark behind the right ear occasioned by the glazed string of a kite \ \ \ \mark between the shoulders caused by the bite of a vicious horse, a mark on the knee, and a scald mark, the size of an eight anna piece, on left hand The prisoner possessed all these marks. The judge held that the case was proved against prisoner and recom mended that he be sentenced to three to five years unprisonment. The High Court (Nizamat) sentenced him to a fine of Rs 1000 for having assumed the name of Pratap Chandra He died in obscurity in 1856 —
Abridged from Celebrated Trials by I Goshal 1902

(c) Martin Guerre's identity -In the second half of the sixteenth century, Martin Guerre, then a young man of twenty, absconded from his village in Languedoc, under fear of being charged with theft. leaving behind him his young wife and infant son Martin Guerre, it was afterwards proved, enlisted as a soldier, and became extremely intimate with a coinrade of bad character named Arnauld de Tilh (or Dutille) Light years after Wartin Guerre's disappearance from his home, Arnauld de Tilh appeared there, represented himself as Martin Guerre, and was at once accepted as the latter by all Martin Guerro's relatives, including his wife The impostor, mainly through his having become acquainted with all the true Martin Guerre & secrets, was able to carry on his imposture with success for several years. At the end of that period a quarrel arose between the impostor and Martin Guerre's uncle, when the latter denounced the former, who was put on his trial At the trial of 150 witnesses, forty swore that the accused was Martin Guerre, and fifty that he was not, the remaining sixty were in doubt Martin Guerre's wife was quite satisfied that the accused was not an impostor. The trial resulted in the condemnation of the accused appealed The Appeal Court found the evidence so extremely conflicting, that they were inclined to reverse the judgment of the lower Court when

the true Martin Guerra appeared. Around de Tille as thereupon con demned, and subsequently confessed his imposture. Some of the points in this case were (4) The accused "had double eve tech in the upper jaw, a sear on the forchead, the nail of the left forefinger sunk in the flech, and four warts on the right hand—all peculiarities possessed by the true Martin Guerre." In other personal peculiarities, however, the accused differed gerally from the true Martin Guerre. [2). "Martin was a skilled fener which Arnauld was not, and Arnauld could not speak can a few moods of Martin as nature Dasque language."—Guy s T M, 15

2 Colour of eyes, skin, and hair.—In some unduvduals one iris differs in colour from the other. The hair reasts putrefaction, hence its colour, etc., may be of special importance in the case of exhunced or greatly putrefied bodies. The colour of the hair may, however, hime been altered for disguise or otherwise, eq darkened, generally by the use of metallic dyes, cluefly lead or silver compounds, for rendered lighter by chlorine or hydrogen-dioxide solution, in which case the roots will be found less altered, and therefore darker than the rest of the bair. The hair is frequently dyed reddish in cliderly Mohammedians.

Case —A portion of a scalp with a tuit of red hair was held to prove the identity of a murdered indigo planter Dick in Nuddea District in 1830 —Chevers M. J. 60

- J Deformities.—Such as moles, 'birth-marks' (nævus), hrro-lip, web-fingers or toes and additional fingers' Birthmarks may be removed by painting with carbonic-acid-tee, in the inflammation resulting the frozen tissue is absorbed, leaving the slain practically normal
- 4 Finger-prints.—Identification by means of finger-prints has now established its claim to trustworthness and has become a most important branch of criminal investigation both for the detection of crime and the identification of the criminal. It has, in the Galton-Henry system, been adopted in India, Indiand, and most civilized countries throughout the world, and has superseded the French untroponenties vy-temo fear-incussurement of Bertillon, and it is legalized under the Indian Lividence Act, all emigrants signing contracts under the Emigration Act

Finger prints appear to have been first practically utilized for the initiation of individuals by Sir W. Herschel, of the Indian Civil Service, who introduced it into the Hugh district of Bergal un 1871 for the purpose of identifying filterate Indian coolies and the executants of documents for registration, in order to detect lake impersonation, which

For the detection of these the hair may be digested in dilute nitric acid, the soid liquid emporated to dryness and the usual chemical tests applied to a solution of the residue or the hair may be uncherated and the metal sought for in the sal (see detection of lead in organic mixtures)

was provalent in the law courts! The matern is and experience thus gained were utilized by Sir Fancis Galton in 1888, in his scientific study of the subject; but it runained for Sir E. Henry (Inspector General of Police, Rengal) to take up the Galton formula and invent a relatively simple ideal system of classification on a numerical basis.

Y The Galton-Honry system is now in general use in India as a check against false impersonation in the case of all subordinate pensioners, civil and military, pavidsh or zenane ladies, for medical certificates and attestation in many branches of public business, under the understuble plague regulations, and for Mobiammedan pilgrims to Micca, to prevent the re employ ment of discharged men, and innumerable other purposes of identification. Whilst the record is of admitted efficacy for the proof or disproof of identity where the person in question is accessible



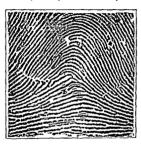
Fig. 5 - Finger print impressions (after Sir 1 Henry)

A, 'plain' B, 'r died impression of the same fager

or has given his mark on a previous occasion, no objection can be offered to this method on the score of caste or religion, or rank in society or sex, as there is no prejudice to be overcome in obtaining it.

The persistence of the specific details of the ridges forming the patterns of the finger-markings has been proved by Gulton to portend throughout the whole period of the individual life. These found on the new-born babe are traceable on the fingers of the same person in extreme old age, and are only efficied when decomposition has set in after death. Galton concluded that there appear to be no bodily characteristics other than deep scars and tattoo marks compared le in their persistence to these markings

The characteristic markings on the skin over the bills of the fingers are the curve I lines termed papillery ridges not the lines called creases. These ridges are thided with minute pores the nouths of the ducts of the sweat glands which appear on the imprint as fine dotted lines. A clearized cut (see Figs 6 and 7) or deep ulcer laves a jermanent mark.

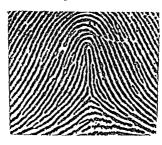


1 so 6 — Magnifiel finger print ArcI pattern (after Henry) b B— file while rate cree in a across lends a are claim of cuts

which shows on the paper imprint as a white space or line. These marks have to be distinguished from possible occidental creases in unrivibility tabling. If in previous In comparing impressions the examiner seeks for similarity or dissimilarity in the type and distins of the indiges of the patients and if his conclusions therefrom are comborated by coincident creases his risk is so much the case. The lines or pupillary ridges are constant and invariable in the same individual exhibit patterns which exactly or entirely correspond. As however single digits of different persons have been found to correspond closely in details great cuttion is needed where only a single digital imprint is available for comparison; and it is now customary in criminal cases to table.

the impressions of all the fingers. A 'rolled' impression, recording the pattern of the whole ball of the finger, is much more perfect and desirable than a 'plain one (see I ig 5, p 57), which is only partial.

Drections for Taking Finger prints 1—Take (1) ordinary white paper not too highly glazed, (2) some ordinary printers ink (3) a roller for spreading it, consisting of a woo len cylinder 3) inches long, one inch iliameter, over which a piece of indiarabler tubing has been lightly stretched, (4) a piece of flat tin as a slab, (5) a pointer which could be a penholder handle with a needle let in at one and to count the ridges, (6) a lens to assist in the counting. The ink roller and slab must be kept



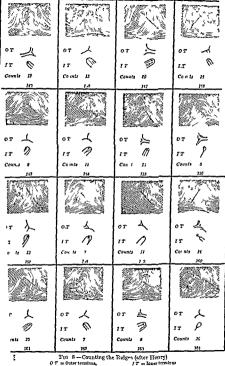
F10 7 - Magnified Finger print 'Loop pattern (after Henry)

N B.-The white transverse lines across the chiges are cicatrized cuis

scrupulously clean and free from dust hairs or gut the ink should be kept in a closed bottle, and the roller wrapped in clean, oiled paper, and all old ink wiped off the slab

I or a 'rolled' impression, the bulb of the finger is placed upon the tin slab, over which the fiturest possible film of printers in his been spread, the plane of the nul being lept at right angles to the plane of the slab, and the finger is then turned over until the bulb surface, which originally faced to the left, now faces to the right. By this means the rulge anticar of the finger between the nail banulatest-wanked, and by pressing it lightly upon paper in the same way that it was pressed upon the inhed slab, a clear rolled impression of the finger surface is obtained Care must be taken to have a very small quantity of lisk in the thinnest film, not to press the finger too leavily on the inhed slab, or subsequently too heavily on the paper, otherwise a blurred or imperfect impression results. A 'plane' imprint is obtained by placing the bulb of the finger upon the inked slab, and then impressing it on the paper without any turning movement.

F R Henry, 4th ed , London, 1913, 20, etc



Preparation of Finger-print Exhibits—Crime investigators require to how how to secure the evidence of inger prints at the seen of crime A smooth article is likely to retain imprints if touched, whilst a rough surface is of little value. Any fuger print found, which is obviously not that of a resident of the house or a previously arrived police official should be oranized with a lens to ascertain whichter it possesses sufficiently defined detail to photograph as the absence of sufficient detail may reader it useless. Ye special camera and procedure for this purpose used by the Loudon police authorities (see Hearr op ct., 100 etc.), slow plates and a developer likely to produce the maximum contrast are used. The results are then presented alongsade the finger imprint of the suspected person, and a sketch comparing the characteristic resemblance, as in Fig. 9.

Latent Enger-prints—It is important to ware the police and others not to handle weapons, etc. which might have upon them, it left to skilled hands to examine valuable silent textimony as apparently in visible marks may be undervisible. Direct pment of apparently invisible flager prints—ID : J G darson a process to dust an impathable power, light or dark, according to the colour of the surface suspected (finely) powdered plumbigo or gree powder! over the surface supposed to have been impressed by the papillary ridges of the fungars in their natural state as regards mousture. The powder will a flure to the papillary lines impress, and can be examined with a lens or permanently recorded by photography.

Classification of Prints for Criminal Work —This requires the services of a practised expert. The patterns of the papillary ridges fall into three main types, and a fourth or mixed one, thus- arches 'loops,' 'whorls,' and 'composites The arches differ from the 'loops in having the ridges running from one side to another without exhibiting any back ward turn (see 1 igs 6 and 7, pp 58 59) In the impressions of the four types there are fixed points which serve useful purposes termed the 'delta' or outer terminus, and the point of the core or inner terminus. The termed 'rods,' or the summit of two rids may be joined to form a 'staple The arches may be 'tented etc , the loops pocket twinned, etc The relative frequency of the various patterns is approximately—Arches 5, Loops 60, Whorls 35 per cent. The greatest variety of pattern is found in the forefinger, and the least in the little finger. In the Galton Henry classification Arches are classed with Loops and the Composites with the Whorls, so that only two divisions of patterns have to be dealt with, and these are recorded on a ches-board like table with 1021 squarcs, the number of possible combinations for the digits The actual formula of each pair of digits is recorded in the form of a fraction of which the upper letter denotes the pattern of the first digit of the pair and the lower that of the second digit, thus the right thumb and for finger becoming

respectively a loop and a wheel, a uduated as  $\frac{l}{w}$ , and a complete formula might be as follows —

$$\frac{l}{iv}$$
,  $\frac{l}{l}$ ,  $\frac{w}{l}$ ,  $\frac{l}{l}$ ,  $\frac{w}{w}$ 

which, converted into figures, might be-

$$\frac{0}{16}$$
,  $\frac{0}{0}$ ,  $\frac{4}{0}$ ,  $\frac{0}{0}$ ,  $\frac{1}{1} = \frac{5}{17}$ 

<sup>1</sup> Trans Med Leg Soc, II, 1905, p 115

which indicate, for record the compartment of the intersection of the 5th vertical row with the 17th interrotal row, if the respective rows are numbered 0 to 51 (see Fig 9 p. also I ig 8, for ridge numbering of an ordinary Loop). Perst the into 3D joint the two leminal points, 'inner' and 'outer terminus If the ridges which cut the line 5B are counted they will be found to number 17, so this Loop is termed a Loop with 17 ridges or 'counts, and if it is the impression of a 'right hand inger' is an 'share or if left hand a 'radial Loop.

In presenting finger-print evidence in court it is necessary to employ an expert to explain the technical details of the exhibits to the court and jury. For India, the Central Fingerproof Burcau at Simla offers the best authority.

Cases -(a) Murderer detected by thumb-prints -The accused Man Sin th. havesth, a defiart at Muttra was convicted of the munder of Duren Pershad The case turned mainly on the identification of the accused by his thumb mark Durga Pershad was apparently a man of some means, but lived entirely alone. He lived a penurious life, without even a parmanent servant in the house. His food was prepared by a Brahman woman, who attended for that purpose twice in the day. On the evening of the 4th of March, 1901, this woman prepared his fool, and when going away left sitting at his house two men, one of whom she identified as the appellant Man Singh She knew Man bingh, because he was a constant visitor of Durga Pershad. Nothing suspicious was heard that might. In the morning, as no answer could be obtained from Durga Pershad's apartments the police were sent for, and when they effected an entrance, they found the old man lying dead in his courtyard, which was covered with blood. The body was marked with twenty four mersed wounds. The old man had apparently been first attacked in his bed and sitting room for the matting on the floor near the bed was drenched with blood His personal ornaments, etc. were gone. and no money was found in the house. All the boxes had been opened. but no ordinary clothes had been taken. But the murderer, in the words of the judge had left a most damning piece of evidence behind him the ground near the body was a brass lotah, containing a little water, and on that lotak, broad and plain, was a blooly finger print, with the whorls and ridges plainly marked. The mark was in the exact place it would be if the lotal were held for pouring native fashion with all the fingers below it and the thumb on the side. The lotal was photographed at once A pugra out of which a piece had been torn, was also found, covered with blood The police formed the idea that possibly the murderer, or one of the murderers, had got hurt in the struggle, and had used this bit of the puges to bind up the wound bome suspicion fell on the appellant, and on the 8th the sub inspector examined his hand, on the back of which he found a long cut the marks of which were visible at the hearing in the Sessions Court In addition to the evidence of the Brahman woman, Valle, Choke elentified the uppillant as one of the men who constantly used to visit Durga Pershad Man Singh was accordingly arrested. One of the Muttra police was sent off to Allababad with a photograph of the impression found on the lotah and with the impressions of the thomb marks of several persons including those of the accused. The impres sions were examined by an expert in the Allahabad Central Office, and the impression of Man buigh a right thumb was found to correspond with the impression on the lolah

Justices Blatr and Buckett in their judgment, remarked. "The witness, who is the head clerk of the Criminal Identification Department, through whose hands, as he sweers, every year thousands of finger impressions pass, swears that the thumb impressions of the appellant's right hand, which is was not to him from Mutra, corresponds exactly with the thumb impression photographed from the lotar That photograph has been enlarged at Allahaba dil vs a photographe included without being



Fig 9 —Identification of Bloody Thumb-print in Jalpaiguri Murder Case dater Sir L. Henry) A, photo mechanical colorgement of actual blood print, B, same of thumb-

A, photo mechanical enlargement of actual blood print, B, same of thumbprint record in police office, C, same of fresh print, D, diagram of characteristic ridges, enlarged

in any way touched up The witness, in the closest detail, gives his reasons for believing that the two impressions are the impressions of the appellant's right thumb. That is evidence upon which we can safely rely." After referring to the test of this witness in the Sessions Court, already recounted in the words of the Sessions Julge, their Lordships continued. "In our opinion this evidence is concluded to the presence of the appellant at the house of Darga Pershad on the might of the

th March and on the morning of the 'th' when Darga Lershad was murdered. The motors for the curnes is not far to seek. This appellant was in very poor circumstances. Previous to the 4th of March he was nobelect to several persons in small assumed money, which we was unable to divelaring. There was also a decree under execution, against him After the 6th he was no possession of money, and paid off as evid evidence. It is not shown to us how he came into possession of those sund after the 6th of March. The only way of explaining it is by his statement to the Dapity Vagristics that he had received Br. 15 and a shawl as his part of the plant for Taking all the above facts into consideration there is unhesistancy; to the conclusion that the appellant took part in the murder of Durgs Pershad and mass possible have been the sole murderer We dismiss the ay peal confirm it e a steine and order that it be carried out according to by a "Carried" and the surface of the contraction to the according to the carried out according the carried out the carried out according to the carried out to the carried out the carried out the carried out to the carried out the carried

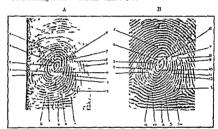


Fig 10—A I hotographic enlargement of mark on glas. B Photographic enlargemen of an imprint of the right foreinger of John McDermott The characteristic points are numbered similarly in both figures (after Henry)

(b) Bloody thumb-great in marder case —In 1850 the manager of a tea garden in the Jalupquin darket was found lying on his bel with his throat cut his despit chor and safe hying leen rified and several hundred rupes earned awa. Monogst the papers found remaining in the despatch box was a calcular on the outsile cover of which were two faint known smudges one of which under a magnifung plass was seen to be the impression of a person a thumb (see Fig. 9, A). This was sent to the contral offee of the Bengil Pohee. If was found to correspond exactly with the right thumb impression of Languit Charan (I), a former servant of the deceased whom hie latter had caused to be impressioned for theft, and who had been relayed from jud some weeks before. If, m. consequence was are set on Brighton, a detrict some before II, m. consequence was are set on Brighton, a detrict some relayed of the property of the contral that the property of the p

brown marks on the calendar were mammalian blood, the inference being that the inturferer or his associate gripped the calendar with his blood stained thumb when rummaging amongst the propers in the despatch box for the key of the safe. The accused was committed for trail below a judge and accessors, charged with murder and theft, and was fanily convicted only of having stolen the missing property, the assessors holding that as no one had see in the deed committed, it would be unsafe to convict hum of the murder, and the Supreme Court upheld this decision

(e) The Depticod case.—In 1905 a man and his wife were murdered in their bed at a house in Depticod, London They were in the habit of placing their money each night in a small cash box kept under a pillow of the bed After the murders the cash box was found in the bedroom broken open, and the money gone. On the sale of its inner tray was a

faint digital mark, which was immediately photographed

Subsequently two brothers, named Stratton, were arrested on sus pueno, it being known to the police that they were in the locality about the time the numbers were committed. Their finger prints were taken, and the right thumb print of one of the brothers was found to be identical with the mark on the cash box.

No one saw either of these men go into the house or leave it Th

finger print evidence was most valuable

They were convicted of the murders, and executed - Times, May 8, 1905

Forgery of thumb print signatures—It is not difficult to forgo thumb prints, as Major II Smith, 138 has shown, by covering the original thumb impression with a damped paper and pressing, by which method the reverse of the original is transferred to the damped paper, and another piece of damped paper, so then put over the roverse and pressed, when a true copy of the original adheres to the paper

Foot-prints of Babies.—To provent the crime of changeling of babies substitution of babies, or the accidental changing of babies by confusion in maternity hospitals, the system is now introduced of taking as a precautionary measure an impress of the babe's footprint, which thus forms a permanent life-record of identity.

The printing is taken in the same way as the finger print. But it may be done so simply that any lay parent can do it for themself. All that is necessary is to cover the sole of a child's foot with printer's inh by means of a roller, and then transfer the impression to a sheet of paper. The ink can be cleaned off the foot with alcohol. Care must be taken not to disturb the impressions before they are dry. There will then exist for all time a record of the baby's identity which would carry weight in any court of faw in after years. Mo matter frow much the feet grow, the lanes will have grown with them, and their pattern will not be changed

So Bertillon's measurements of the ear and certain bony points which do not vary between adolescence and old age are specially used for the detection of criminals, but being more difficult to make, and varying so much with the personal equation of different operators, the use of this system has been given up by the police in India in favour of the finger-print

.

system The ear measurements are obviously useless in so many tribes which distort their ears by plugs and heavy rings, and in the thickening of leprosy

# Acquired Peculiarities.

- I General condition of body -Fat and muscular or the reverse, baldness, etc
- 2 Scars and traces of old injuries.—Sevre by wounds, burns, and ulcers (syphilitie and other) tend to contract and become more linear in time, but being less viseular than the rest of skin, they are rendered more visible by friction. If necessary a lens should be used. Their number, situation, size, whether adherent, depressed, etc., should be noted—the size should be measured with compasses. A sear is mentable site a wound, but where there is little loss of tissue and no suppuration the sear may be slight. Small linear sears may disappear in time. Casper notes that the linear sears of cupping disappeared in three years. Large sears never disappear, and those of burns scalds and crushed wounds are more permanent than those of incised wounds. No sear on be artificially removed. It is very difficult to swear to the ago of a sear, some remain red and vascular after many years.

Old fractures and ununited fractures may enable the identity to be established. The body of Lavingstone, the great African explorer, was identified by an ununited fracture of the lumerus due to the late of a hon. In case of Hanbil Nazeer Khan, identity was established by a reculiarity in the ray bone.

Grac — A Boppal Impostor proteoded he was a native grotteman whose death and consignment to the Ganges some years before was plant; proved. He denot the former fact and alleged that after being thrown into the river he review. Medical evidence exposed the imposition by proving that part of the body of the deceased had been raten away by an incumble descene.

3 Tattoo-marks —Unlike scars which are the result of accident or discass and located vaniously, tattoo marks are the result of deliberate choice and often by the same operator, so that the same design may be reproduced exactly in the same substation on more than one individual. The pregnent generally used in India is black or blue, but in Burma red is also extensively used. Pigments consisting of vermilion and ultramarine disappear more readily than Indian ink, soot, gunpowder, or carbon in other forms, which latter, according to

<sup>1</sup> B No. Ad Rept , 122 Chevers 48

Tidy, never disappear if inserted properly below the epidermis. The shortest time in which non-carbonaceous mirks disappear is agreed to be ten years. Tattoo marks cannot be removed unless the skin is destroyed, in which case a sear would remain. The claimant in the Tichborne case (p. 54) had a sear where it was sworn Arthur Orton had been tattooed. Faded tattoo-marks are made more distinct by strong friction.

- 4 Loss of teeth and artificial teeth.—Loss or deformity of teeth and presence of false teeth or correspondence of the jaw with a mould taken by a dentist for the purpose of fitting artificial teeth may be important in establishing identity (see Parkman's case, p. 69). The body of the Raja of Benarcs, who was sirun in battle by Kuttub in 589 of the Hijra, was recognized among heaps of the slain by its artificial teeth which were fixed in by golden wires and wedges. A bute may show certain teeth missing, and so identify the biter
- Occupation marks.—Hands horny or otherwise, stains in hands of dyers, photographers and punters, needle pricked fingers in tulors, etc., this is chiefly useful in unknown dead holtes.
- 6 Memory of past events —This is often of great importance in cases of imposture, see Tichborne case, p 54
- 7 Handwriting, speech and voice gut, tricks of manner, etc
- 8 Clothes and jewelry, viz, ring, watch, visiting card, letter, etc These are only of very secondary importance, as they are easily changed, for characteristic differences of native dress, see p. 50

### Light sufficient for Identification,

A flash of lightning undoubtedly affords sufficient light to enable an undividual to so distinctly discern the features, etc., of another, as to be able to subsequently recognize him. The flash caused by the discharge of a pistol or gun, provided the circumstances are favourible, also similarly affords sufficient bight for recognition and identification. I avouring circumstances are close proximity to the discharge on one side of the line of fire, absence of other light, and not much smoke from the powder.

<sup>1</sup> Dow s Hindustan, I , 145

# Identification of Fragmentary Remains or Bones only.

The first thing to determine is whether the fragmentary inemains are human or not. Then you note which side of the body or limb they belong to and try to fit the fragments together, noting the means by which the fragments have been separated, whether cut, or broken or torn saunder or merely grazed by dogs, jackals or other beasts or birds of proy. The state of decomposition of the soft parts may give a cline to the length of time clapsed since death. If yital organs are present, note whether they bear marks of injury likely to have caused doubt.

Where bones only are available it is desirable to record the details of the sextent bones individually (see Fig. 1, p. 40) for reference and proof of age, stiture, etc. Any malformations should be specially noted. The odour of recent bones should be noted for the time of death. The odour of bones cleaned by ants, etc, is very different from that of old bones cleaned by decomposition in the earth.

"Professor A Powell has upset a remantic police theory of murder by finding the nutrient canals of a skeleton filled with red wax containing much arsenic. He concluded the bones had come from a dissecting room."

In another case the skin from the lower part of the abdomen showed a linear operation scar with only two transverse stitch marks—one at either end. This suggested the operation had been performed by an American surgeon who used a continuous suture so that all the loops, except the first and last, remanned buried below the surfue. This fact led to the identification of the body.

Carre —(a) Callus and fractured bones —Detachment of sacrum.—At Bankura in 1834 to a witnesses deposed that the deceased, Meah Ahan, was beaten a few hours before hus death, one of the blows breakung his rib. The only bone produced in court was a rib, this had been broken but had osserous callus around both fractured ends, from which the civil surgeon was of opinion that the fracture must have occurred as feest seen months after the centre of the ham and the bones were found after the centre of Meah Ahan and the bones were found clean and free from periodeum ligament, and cartilage, which the civil surgeon considered rendered it extremely improbable that the bones were those of a person who had ded three months previously. Dr Chevers however, considered that mere cleatimes of the loons could be accomplished by matural decomposition if exposed to the rawages of multitudes of ants and insects, the odour however, of ants and insects, the odour however, of cent hore thus rapidly cleaned by insects would in no way resemble that of one which laid gradually undergone dermatation underground.

- (b) Dr Parkman's case -Dr Parkman, of Boston, U 5, was last seen alive entering the medical institution in which Dr Webster was a lecturer on chemistry A week afterwards suspicion having been excited, search was made in Dr Webster's laboratory, and the remains of a human body discovered In one place a pelvis, right thigh, and left leg, were found, and in another the entire trunk and the left thigh Among the ashes in the furnace of the laborators, fragments of bone, blocks of mineral teeth and a quantity of gold, were also found bome of the chief points in the case were (1) No duplicate parts were found (2) The pelvis was clearly that of a male (3) The parts of the body were free from all traces of the preservative fluids always employed in the dissecting room of the college (4) Pucing the parts together it was estimated that the height of the body of which they formed portions was 70} inches, or exactly the mussing Dr Parkman a height (5) Three of the fragments of bone found in the ashes of the furnace when put together, made up the greater portion of the right half of a lower jaw This was of peculiar shape, certain teeth were wanting from it, and it was found to fit exactly a cast of Dr Larl man s jaw, which had a short time before been taken by a dentist who had supplied Dr. Parkman with artificial teeth similar to those found in the furnace ashes Dr Webster was convicted, and subsequently confessed that he had murdered Dr Parkman - Guy, I M 82
- (c) Careless identification of bones A married woman and her child, a girl aged four or five, disappeared at Meerut, under circumstances pointing to their having been murdered by a man named hulloo, the woman's paramour hulloo absconded, but was subsequently appre hended while trying to sell ornaments proved to have belonged to the missing woman hulloo when apprehended made contradictory state ments accusing other parties of the murder and ultimately led the police to a place where several human bones were found, among them portions of two skulls one small, the other larger Among the fragments of the larger skull was an entire upper jaw (and half a lower jaw) with the teeth attached, and, near the bones, clothes identified as having been worn by the child, were found The civil assistant surgeon, to whom the bones were sent, reported the bones to be those of two children one about eight years, the other about eight months old On this Kulloo was con victed of theft only A re inquiry was ordered, and at the trial held fourteen months afterwards the civil surgeon was of opinion that the assistant surgeon had mistaken the bones of a small adult female for those of a boy, of about eight years old The judge convicted the prisoner of murder, sentencing him to transportation for life had the portions of the larger skull been examined, and a record kept of their appearance, and of the teeth in the portions of the jaws, the question whether they belonged to a child of eight or to an adult could probably have been determined without difficulty .- Chevers, M . 66
- (d) Teeth and carthlage tumour—(i) Identify of body was established by absence of left lateral meisor and by hair on back of head Prisoner convicted (ii) Remains of carthlagmous tumour of the neck in a body almost skeletonized led to identification—Ind Med Gaz, January, 1875
- 7( The Stature may be approximately fixed by laying out the skeletal bones and allowing 1½ inches for the soft parts. If the femur is not found, the width of the two arms abducted from

the trunk gives the 'fathom' which nearly coincides with the herebt.

For estimating the stature from one cylindrical bone, Orfila gives a table which may err to the extent of over 4 inches

Indy gives the following data in percentages of height

Humerus from 17 I to 19 5 . radius 13 2 to 14 5 femur. 22 6 to 27 51 . til is 18 5 to 22 15 spine 36 8 to 31 54

To the above is added I to It inches for the soft parts of sole of foot and the scalp the variation however is too great to be of much service In a dry skull with a hole in it of an alleled fracture note if the hole is due merely to the falling in of an os triquetrum (when its margins will be jagged) or to a true fracture

Even when identification is not established the death centence may yet be passed

Curs -(a) Death sentence with non-identified remains - Reg v Sundamen - Deceased was in luced by two others to leave his village under the pretext of looking for stolen cattle. On the way he was murdered On the fourth day remains were foun !- his skull in three or four places grey hairs a pair of shoes and a bag with flint and steel. The jackals vultures etc, had nearly picked the bones clean was circ imstantial evilence and the sentence was-death to first prisoner -M : Iras Reports of For : large Udalut 1859 (b) Non identified remains -Iteg v Mil al al i ja -Deceased was a

Brahman who had been sent to cash a cheque on a Friday and did not return and on the following Wednesday the remains of a man with a Brahmanical thread, were found The witnesses could not identify the body as the features were entirely decomposed Some cloth es near the body were identified and certain persons who had been last seen with deceased were, on the strength of circumstantial ovilence convicted. The sessions judge recommended transportation for life because the body had not been clearly identified but the High Court (Four large Udalut) seeing no reason to doubt that the remains were those of the missing man sentenced to death -Ma lras Peports of Longdares Udalut 1800 Honore June 1859

#### CHAPTER II

### EXAMINATION OF THE LIVING PERSON.

This is usually much simple, than the examination of the dead in criminal cases, is it is often little more than a mere matter of surgical diagnosis. The medical expert should, be furnished by the police or others with a note for his guidance, identifying the person and detailing every known circumstance of importance in the case on which his examination and opinion are required. This should be sent along with the person who is to be examined. In practice, the information thus sent to India is generally meager, and omits points of critical importance and often it is untrustworthy and occasionally false.

The Record of the medical expert should note —(1) The exact time and place of your examination, (2) the name, see, age, occupation and caste if any, of the person examined, (3) the personal identity, how made this, in the case of a living person, is usually made by the police official who brings the person for examination or by some other mutually known individuals—whose names should be noted by you in your record and report in the case of unknown persons the necessary particulars for identification should be noted from amongst those detailed on page 35, etc., (4) details of the examination of the alleged Wounds, or evidences of Rape (Chap XIV), Abortion (Chap XV) Insanty (Chap XVIII) Poisoning (Chap XXI), etc., as described in the special chapters

Examination.—In the case of persons accused of criminal violence, you will look for scratches and other evidences of a struggle, such as the presence of hairs, blood stains, etc., on the body and clothing. But before making an examination of an accused person you must first obtain his consent and inform him that any indication which may be found of an incriminating nature will be used as evidence against him, and if he will not consent, the examination must not be made. Wetther must

72 EXAMINATION OF LIVING PERSON.

you ask 'leading' questions or those which suggest the particular answer

Your examination in some cases, such as rape, may extend to besides (1) the person of the victim, and (2) the occused also to (3) site of the alleged offence, and to (4) stained clothes, weapons, or other articles submitted to you for examination.

The Exhibits, as these latter objects are termed, should, after examination, be carefully preserved by you as evidence, and should, whilst in your custody, be carefully serled up by yourself and locked away to prevent their being tampered with If sent to the Chemical Examiner, they should be duly labelled, attested, and sealed with your personal seal, of which an impression may accompany your letter to that officer (see detailed 'Directions' in Appendix IV ) Where there is more than one exhibit, each should be marked by a distinctive letter or number

As the alleged cause of injury is not always the true cause, it is necessary for you to consider other possible causes than that which may be specified in the indictment

Case -Alleged beating with poisoning -Stupor ascribed to a beating found really due to Daturs poisoning -A gentleman heat his punkah coolie with a slipper for going to sleep—some hours after the man was taken seriously ill. He became giddy and partially comatose. In this condition he was immediately tal on before the doctor. He was made to voruit, and brought up a quantity of Daturs seeds, which he had taken in a fit of passion after a love quarrel Now, if this circumstance had occurred away from the station and the man had died, the body would have been sent in with the remark ' said to have died from the effects of besting The medical examination would have established death from the effects of Datura or in default of a thorough examination "no apparent traces of injury - Chevers, Manual Met Jur , 85

Your examination in cases of griceous hart alleged rope, criminal abortion, of insanity, should include the points noted in Appendix I

G\_J, as well as those under those respective articles

The Report Certificate of the results of your examination should invariably be prepared from your recorded notes with the utmost care and scrupulous precision, never perfunctorily Write legibly and use in mentioning a disease the 'Nomenclature of Diseases' Never sign a certificate blant, leaving the details to be filled in by an assistant. Where formal certificates are called for, read carefully the printed instructions and refresh your memory each time you write a certificate. For death certificate, see p 98.

#### CHAPTER III

#### EXAMINATION OF THE DEAD BODY.

THE medico legal examination of a dead body for an inquest or their inquiry is one of the most important duties of civil surgeons and police surgeons and for its proper performance the most expert and experienced pathologist available should be employed in Law no assult can be committed against a dead body, so that in performing a post mortem examination you are not committing an offence Yet it is an operation only to be conducted under due officed warranty

# Legal Necessity for the Examination.

The object of the examination is to ascertain the cause and manier of death in all deaths from volknee, or in sudded deaths from unknown causes and in those suspicious cases in which the medical attendant is unable or refuses to give a death certificate (see p. 98). In such cases it is not otherwise possible to exclude death from criminal violence even when unsuspected in death occurring apparently from natural causes? For it is not uncommon to find that cases of apparently natural death without any external mank or wound on post-mortem examination prove to be cases of fatal poisoning or fracture of the skull or ribs, rupture of internal organs etc. See cases under-noted

Cases—(a) An old man was found dead in beloos morning having apparently died in sleep. Tace placed pale P M examination showed death from carbolic acid possoning. There was no smell of the acid in the norm and no bottle was found near the body though afterwards one' was bund containing the acid in the house. No colour was noticed until the atomach was opened. There was no corrosion of lips and nothing externally to indicate the nature of the case—Sir H H Lattlejohn Trans Med Ley Sec. 1, 1902, p 10

(b) \ man travelling by train to Edinburgh, was found some stimus off apparently saleen under influence of alcohol, and died before reaching the hospital There was no odour or bottle to be found and nothing to suggest death from other than a natural cause The magistrate demanded only a certificate based on external examination, but owing to the man's hite being insure 1 a P M examination was made and revealed poisoning by prussic acid probably suicidal—Sir H H Littlejohn Trans Mc1 Leg Soc 1, 1962 p 16

(c) An old man was thought after respection of the body to have died from heart falliur or old sige, but was subsequently found to have shot himself in the month with a revolver. There was no external evidence of the cause of death, no altersition of features no efficience of blood and no weapon found until some days after the event —5ir II H Lattleedin Trans Med. Lee. Sor. 1 1902; n. 17

The body of a murdered person must as a rule be produced be identified and be examined in order to warrant a conviction in law and even a trial. The many facilities for destroying dead bodies in India (see p. 20) affords the criminal in this country unusual opportunities for destroying this important part of the evidence of his unit!

On the other hand the sentence of death was confirmed in a case in 1901 where the body was never found-

C'1sr — Death Sentence when Lody not found — The appeal of Shemanagar Singh the Inappur Annah are who was convected of the number of a woman and sentence I to death by Mr. Stuner Acting Season Julgo of Allahabad came before Mr Justace Blair and Mr Justree Channer in the Ulrhabad Righ Court recently In this case the body of the woman was never found having been thrown into the Ganges and Mr Stuart referred to the question of passing sentence of death when the body of the muritered person had not leen recovered. Their Lord sings in the course of their julgment and. No case could have been been considered that the sentence is the only sentence possible. Their Lordships confirmed the sentence is the only sentence possible. Their Lordships confirmed the sentence of each — Lordships confirmed the sentence of each — Lordships confirmed the sentence of

### Method of Examination.

First the dead person is to be identified and then the Cause of Peath is to be ascertaimed. Before beginning the examination it is advisable that the examine be informed regarding all the circumstances of the death as far as is known whether any violence was received or any known disease or condition which may have contributed to the death. Otherwise certain questions may be raised at the trial which the examiner may be unable to answer through not having his attention specially

According to Indian law as administered by the Ninmat Adalast the Indian of the body is not indispensibly necessary to warrant even a capital sentence but in such cases an irrevocable sentence is not smally read to the control of t

directed to them Begin your notes by recording the exact date and hour, place when and where the examination is made, and how the body was identified

The Identification when the body is found not long after death can be easily made by some one who knew the deceased intimately. But if putrefaction has set in, or an accident has disfigured or destroyed the features, or only a skeleton be left, the identification should be made by the medical expert in the manner already described (p. 35) for sex, age, state of teeth and jaws, height, general condition, colour of eyes and hair, whether any part denuded of hair, deformities tumour, old scars, tattoo, perforations for nose and ear rings, and everything distinctive in the way of dress a ring, watch letter or card, artificial teeth, sample of hair etc should be kept as evidence by the examining officer When a body is that of some unknown person a photograph should be taken In a skeleton the following points should be specially noted (1) whether the bones are human or animal, (2) sex, (3) height (4) age, (5) race, (6) deformities or signs of previous injuries, (7) position in which bones are lying, and (8) probable length of time they have been buried or lying

The Cause of Death in suspected criminal cases is sought for by (1) Inspection of the position attitude and surroundings of the body on the spot where it was found before removal, (2) External examination of the body itself and its clothes and coverings (p 76), (3) Internal post-mortem examination (p 95)

#### I Position, Attitude, and Surroundings of Body.

If summoned to the spot where the dead body has been found and as still lying note carefully before removing the body or displacing its clothes —

1 Attitude of body and position relative to surrounding objects. Note whether the body is lying on the ground or floor, or is lying on a bed, couch or other article of furniture or is seated or supported in a semi-crect or cerect attitude and if so how supported, or is suspended partly or completely by a ligiture round the neck, etc., etc. Note the attitude of the limbs, and the position of the body in regard to surrounding objects, for example, whether the body is lying at the foot of a precipied, tree or other high object from which it may have fallen, or is immersed wholly or partly in water, or is lying in a room, and if so in what part of the room, etc., etc. Photographs for these and other conditions are desirable

2 Nature, condition, and position of objects in contact with or lying near body. Note if any objects are lying loosely in or are tightly grasped by, the hands (not merely gluing by clotted blood), and if so, their nature and condition Note any marks of jetting or spotting of blood on the walls etc their presence indicates the person was still alive where found Note the position, nature, and condition of any ligature on the body, and the exact situation of the knot, whether or not any stains of blood vomit, etc., are present on or near the body on floor, walls doors, windows or furniture or any finger or footmarks, and whether any weapon or any vessel likely to have contained poison is lying near it, preserving such weapon, vessel, etc for further examination whether any confusion in the furniture or other signs exist in the neighbourhood of the body indicative of a struggle having taken place, or of the employment of weapons, or generally of the presence of persons other than the deceased, at the spot about the time of infliction of the injury

Although examination of the spot where a dead body has been found and of the position of the body in regard to surrounding objects often affords valuable information as to the circumstances under which death occurred (see cases of 'Wounds'), it must be recollected however, that the spot where the body has been found may not be the place at which the act was done which caused death. In such a case the question will What power of locomotion remained to the deceased after the act was done which caused his death, and was this sufficient to enable him to move from this spot at which the act was done, to that where the body was found? 1 The answer to this question may, it is evident have an important bearing on the question Was death due to homicide suicide, or accident î

#### II External Examination of the Dead Body.

Before detailing the method of this examination (p 92), it is desirable here to consider the Modes and Signs of death, as two questions often asked are Is life extinct? and How long has the person been dead?"

Death Modes -By 'death' of the body is popularly meant 'somatic' (as opposed to 'molecular 2) death ie the total

<sup>&#</sup>x27; See ' Wounds' Chap VI

\* ' Molecular death of the in lividual tissues and cells of the body does not occur full some time after somatic death

extinction of the vital activity of the entire body which is kept going by the heart and lunga acting under the control of the brain. Hence it is usual, following Bichat's arbitrary classification, to speak of three Modes of Death, according to whether death begins in one or other of these three organs respectively, irrespective of whatever the remote cause of the death may be —(1) syncope (death in heart), (2) asphyxia (in lungs), (3) coina (in brain)

A more practical view and more in keeping with the facts is that formulated by Professor Powell for the assistance of medical practitioners in doubt whether to certify the cause of death as coma, syncope, or shock. He writes "Even in cases of gross Lasions of heart or brain, death in 'shibition,' 'shock,' or 'syncope' arises from a paralysis, a future of the heart muscle to contract. Immediately after death owing to failure to act—to contract—the heart is in diastole. Nature abbors a vacuum, therefore both sides of the heart are usually full shortly after death from inhibition.

"Later, when ryor morts sets in the heart like the other muscles, becomes rigid contracts and expels the blood from its cavities. If the autopsy take place now, Bichat's empty heart is found. Later, when rigor passes off, and gaseous decomposition has set in, the pressure of the gas drives the blood from

the veins into the right side of the heart and distends it.

"Hence in death from syncope the post morten signs vary

according to the time at which the autopsy is made
"1st Stage — Heart in diastole flabby both sides dis

tended '2nd Stage -In rugor mortis, both sides contracted and

empty
"3rd Stage —In decomposition the right side, except in
cases of homorrhage or perforation of the abdomen or thorax,
will be full

"After death from asphyxia the pulmonary vessels being full the contraction of rigor mortis is insufficient to empty the right ventricle'

For mortem signs of these modes of death are — In syneope if death has occurred by ansuma both sides of the heart are found empt, and the heart itself, if examined soon after death, is contracted. If death occurred by asthens or by possioning with prusion send the heart is found relaxed flabby, with its cavities empty or full—if the latter, both sides are equally full. In come and asphyras the venous system and right side of heart and lungs are goyered with dark blood and the left side of heart is usually empty. In come there is effusion of blood into the serious cavities apoptlexy, rupture of vessels in fracture of skull to. In asphyras there is much greater engorgement of lungs and venous system than in come and the lungs may show apopletely effusions into their substance with patches of superficial emphysema and sub pleural ecchymics or Tardieu s spots (see 'Asphyxia') In some cases of sudien death the most careful examination fails to find any of these positive lesions. In such cases it may be that death occurred by the sudden stoppage of the heart by rollent emotion.

#### Signs of Death.

"Lend me a looking glass, If that her breath will moist or stain the stone Why, then, she lives!

Shakespeare s King Lear, \ 3

The fact of actual death is ordinarily ascertained with little difficulty. The most patent and positive sign of death is the commencement of general purteation of the body, which takes place some time after death. But a considerable time before putrefaction has set in, the fact of death is occasionally the subject of some doubt. Cases have occurred in which persons in a state of deep trance or catalepsy have been supposed to be dead and been buried airte (see below). It is well, therefore never to give a death certificate, or think of opening the body until you make quite certine that the body is actually devid as detailed in 'Signs of Death (p. 81), and 'Apparent Death and Death trance' (see below).

Simulated death for purposes of extortion is easily detected by pricking with a pin or by the application of a flame or the actual cautery to the skin or insertion of cayenne into the

conjunctiva

#### Apparent Death, Death trance, and Premature Cremation or Burial

The tragic possibility of cremating or burying live persons is in India a very real danger in view of the hurried disposal of bodies within a few hours after apparent death, owing to climatic reasons and the want of sufficient medical examination Even in Europe where a long interval of several days intervenes numerous authentic cases are recorded of people being buried alive or rescued by accident on the verge of the grave. In India many cases also are reported t and there is reason to believe that this practice is not altogether infrequent. Such individuals rescend from the funeral pyre usually lose their casts, and pyre attendants have admitted that when bodies show agins of animation they stuff mud into the mouth and nostrals of the body in the belief that the movements are the work of evil

<sup>&</sup>lt;sup>2</sup> Indian Jour Med and Phys Science 1836 I, 889 Calcutta Jour Med, 1860 II, 883 W Tebb Premature Burnal, London 1896 pp 60-68, 90 91 195 etc.

spirits. Suspended animation may possibly occur not merely in the rare instance of lethargic stupor and catalensy, but in the commoner acute diseases, cholers, fever, sunstroke, and other nervous affections, traumatic concussion, tetanus, 'teething' convulsions, lightning stroke, drowning, chloroform poisoning, collarse after child-birth, in still born infants. In such cases, where there is the slightest doubt of actual death, artificial respiration and other restoratives should be assiduously practised; even when the circulation and respiration have apparently ceased In the case of infants these attempts to restore the possibly latent life should be persisted in for several hours (see cases below), and in no case should one single 'sign' of death short of putrefaction be relied on t The salutary British military rule which compels a post-mortem examination on every soldier, not earlier than fuelie hours after disease, 19 a safeguard that should be made of universal application in India In 'death trance where no sign of vitality can be recognized, the presence of life may be ascertained, (1) by the absence of any sign of decomposition, (2) by the normal appearance of the fundus of the eye as seen by the ophthalmoscope, (3) by the persistence of the excitability of the muscles to electricity -this excitability disappears in about three hours after actual death

Case —Premature Bunal.—The celebrated actress Mile Rachel, 'died at Farson 4th January 1859 After the process of embalming her body had already been begun she awoke from her trance but died ten hours later from the injuries thus inflicted —Dr Hartmann, Premature Burnal, London, 1890, p. 80

Case —Yeg's Estatuc Trance —In Delhi in 1889, Dr H C \sen and his brother, Mr Chandra Sen 'Unucupal Secretary, examined a well known Yeg: devotee in a self induced trance in which he appears to have been sented cross legged in Buddha fashion. They found that the pulse had ceased to beat altogether, nor could the slightest heart beat be detected by the stethescope. The Yeg's was placed in a small subterrancous masonry cell and the door locked and sended by the city magnitatuc Ai this expiration of thirty three days the cell was opened appearance, the limbs having become stiff as in 1907 morful. He was brought from the vault and the mouth rubbed with honey and milk and the body massaged with oil In the evening manifestations of life returned He was fed with a spondile of milk, and in three days was able to eat his normal diet, and was alive seven years after —W Tebb, Premature Burnal, 1896, pp 44, 45

Gase — Children resuscitated four to seven hours after apparent death—Trot Trot reported a child aged three as resuscitated by artificial respiration continued for four hours and not commenced until 3½ hours after its apparent death—Trdy, Leg Med, I, 1, 29 Ogston records the case of a child being alive about seven hours and a young woman alive four hours after they had been left as a death. The exact moment of death (i.e sometimes of importance not only in cases of suspected foul ply (see Onset of Cadarere, D \$5), but in successorship where it is necessary to prove that a child was or was not born before the death of a testator, as a will take effect from the moment of the death of the testator, and not from the date of finding or provinc the will.

Legal presumption of death—In India the low is (a) that if a person is proved to have been alive within thirty years, the legal presumption is that he is still alive, except (b) if is proved that the person has not been leaved of for seven years by those who would naturally have heard of him if he had been alive, in which case the law presumes that he is dead (as 107 and 108, 1 LV Act). The law, however, presumes nothing as to the time of his death, the period of which, if insternd (as it often must be in cases of succession and inheritance), must be proved by evidence. In either case the presumption arising may be rebutted by proof, in case (a) of the person death, in case (b) of its being still alive. In France, a legal presumption of death arises after thirty five; pears of absence, or offer one hundred wears from date of

Question of presumption of Survivorship - When two or more persons die at almost the same time, or by a common accident, the question may arise who survived longest, and if no direct evidence on this point is available the question becomes one of presumption of surgivorship As an example of the cases in which this question arises, suppose A to have left property by will to B, and that A and B die by a common accident, no direct evidence being available as to whether A or Il died first. Here the question of presumption of survivorship may arise, because if A died before B, B may be considered to have succeeded to the property left hun by A, and B s here inherit; while if B died first, A's hears inherit, seeing that B never succeeded to the property willed to him by A In some countries definite rules of law exist by which such cases are decided. In France for example, some of the rules laid down are (1) If all those who perished together were under fifteen, the oldest shall be presumed to be the survivor (2) If all were over sixty, the youngest shall be presumed the survivor (3) If all were between fifteen and sixty, the males shall be presumed to have been the survivors if the ages were equal, or the difference in ages not greater than one year, in other cases the youngest shall be presumed the survivor. The English law presumes nothing in cases of this kind, and if therefore a person made a claim and had, in order to substantiate it to prove that A survived B. and had no proof of that fact beyond the assumptions arising from age or sex, he could not succeed It may, however, be nointed out, that in questions of this kind it is likely that the strongest lived longest. There are, however, certain exceptions, eq (1) When a mother and child both die during delivery, if the death of the mother has been caused by hemorrhage, it is probable that the mother died first. (2) If a number of persons die from the effect of excessive heat, it is probable that the adults died first, children and old persons bearing heat better than adults (3) When the cause of death is drowning, as females are more likely to faint than males, and as the occurrence of syncope delays death by asphyxia, it is possible that females may survive longer than males however, there has been a struggle for life, it is probable that the males,

being stronger, survived the females (4) Where the cause of death is starvation, aged persons (if healthy and robust), requiring less food than

The chief Signs of Death are - The chief Signs of Circulation or Heart-Beat, complete and continuous.—The entire cessation of the circulation for the circulation for the continuous of death. over five minutes is usually in itself evidence of death. Internal over the minutes is usuary in used evidence of actual anguard cases of fainting and prolonged typhoide of low type, and a system of suspended animation the heart may cease to best for several asseconds, and in newly born infants and in the applicatily life. drowned may cerso for ten or fifteen minutes, but continuous and complete cessation means death. M Raver, from observations on the dying, assigned seven seconds as the maximum interval observed between the last two pulsations of the heart Tidy (Leg Med., I p 138) quotes a case of a min aged 33, where for eight minutes no heart sounds could be detected, the man ultimately recovering

### Suspended Animation under Anaesthetic.

Case - Child resuscitated after Heart had stopped for thirteen minutes - A Davies, aged six, Streatham, was having his tonsils removed for adenoids at Guy's Hospital in 1916 when the heart failed An incision over the cardiac region was made and the heart massaged, until its action was restored Recovery was complete and the boy now runs about as usual "It is certain that the heart had stopped at least thirteen minutes '-Guy's Hospital Magazine, 1916

Suspended animation-Voluntary.-Cases are recorded of persons who have apparently possessed the power of voluntarily suspending the action of the heart.

Cases -(a) Case of Colonel Townshend, quoted from Cheyne (Guy, For Med. p 214) -"He (Colonel Townshend) told us that he had sent for us to give him some account of an odd sensation he had for some time observed and felt in himself, which was that, composing himself, he could die or expire when he pleased, and yet by an effort or somehow he could come to life again, which it seems he had sometimes We all three felt his pulse first, it was tried before he had sent for us distinct though small and thready, and his heart had its usual beating He composed himself on his back and lay in a still posture some time , while I held his right hand, Dr Baynard laid his hand on his heart, and Mr Skrine held a clean looking glass to his mouth. I found his pulse sink gradually, till at last I could not feel any by the most exact and nice touch Dr Baynard could not feel the least motion in his heart, nor Mr Skrine discern the least soil of breath on the bright mirror he held to his mouth. Then each of us by turns examined his arm, heart, and breath, but could not by the nicest scrutiny discover the least symptom of life in lum. This continued about half an hour. As we were going away (thinking) him deady we of served some motion about the body, and upon examination found his pulse and the motion of his heart gradually returning he began to breathe gentivan I speak softly. Col Townshend duch the same e tening and on post morter: examination all the visces were found healthy except the ki lneys for disease of which he had been long under treatment.

(b) Dr Duncan Elinburgh, mentions the case of 'a medical student who like Col Townshen I simulate I successfully the appearance of death, be died however, some time afterwards of disease of the

heart -Ogston W i Jur Lect 364

1 y ) usly the hope set an

Test to ascertain whether the circulation has ceased —(a) Pulse—Teeble pulsations of the heart may not be preceptible at the wrist be added the radial arteries are sometimes abnormal in their distribution (b) Auscaltano—Stetchescope may fail to decte a very feeble pulsat on of the heart (c) Tie cord ughtly round a finger—II any circulation is going on it change will well beyond the lightante (i) Open small artery if still in doubt. No praining spurt will occur if the heart is not beating (c) Heat or a blater on akin will not produce a true vested with red marging on a lead body (See \*Ruims)]

2 Cessation of respiration, complete and continuous— Three and a half minutes is considered the extreme limit during which respiration may absolutely cease and life be maintained. In divers and in Chejne Stokes respiration two and one minutes respectively are the probable limits. In newly born children life has been known to continue for a considerable period without ryspiratory movements being apparent and occasionally in older individuals.

apparent and occasionary in order marvidum

Tests—(a) A coal bright looking glass held in front of the mouth will be dummed by the mouther of the breath ir separation at going on (b) A feather 1 eld over metrics will move if respiration, is continuing (c) a shallow seased of where or mercury placed on the cleek will show movement in its reflection of a spot of light from its surface it there he movement of the chest walls.

Cohe — Supended respiration — Professor Maschia of Progrus, rotated in his testures that a mature chill which showed no signs of the was placed in the anatomical rooms of the university, left, there for fourteen hours and then taken to the physiology classroom. On laying open the chest no blood flowed from the integriments and soft parts in front. When the heart was received it was seen pulsat ng at the rate of twenty beats per minute. The lungs were seen to be in the factal condition.—Ogstom Med Jar 265.

5 Changes in the eye, ry loss of rensibility of the pupil, loss of transparency of the cornea, loss of tension of the eye-ball. None of these are reliable. The pupil may for a short time after death still respond to the action of atropia, and loss of transparency of the cornea and of tension of the eyeball may occur during life.

- 4 Cooling of the body.—After death the temperature of the body tends to fall to that of the surrounding objects, and if these, as is usually the cise, are lower in temperature than the body, a gradual cooling of the body takes place.
- In death from certain diseases, however, the temperature of the body may, at the time of death, be higher than the normal, and may even rise considerably after death. Thus in cases of death from yellow fever, cholera, small pox, rheumatic fever, Bright's discase, abscess of the liver, pentonitis, tetaffus, and injuries of the nervous system generally, etc., a post mortem rise of temperature, amounting in some cases to even 9° F, has been observed ' owing to chemical changes in the molecular life of the tissues and partly in some cases due doubtless to microbic activity The normal body temperature in India ranges from 97° I' to 99° I , whilst the mean temperature of the air and surrounding objects in India is frequently 90° to 97° I , or even more in the summer and autumn Hence a body may rapidly 'cool as far as is possible under these circumstances, and so permit of rigor mortis setting in at a very much earlier period than in temperate Furope The average rate of cooling in a temperate climate is about 4° \( \Gamma\) during the first three hours, and afterwards about 1° \( \Gamma\) per hour. In temperate Europe a dead body is cold in from eight to ten hours. In tropical or sub tropical India much less time is required, as the body has to cool through far fewer degrees of temperature to reach the temperature of the air and its surroundings Loss of heat is delayed by (1) Acute fever as the cause of death (2) Sudden death, as the nutrient material continues to burn after death (d) High temperature of surrounding air or water (4) Stillness of air in small room (5) Obesity and bulk Bodies of children and the agod cool more quickly than middle ago! (6) Covering of body by non con ducting clothes, etc retards loss of heat It is hastened by (1) Chronic wasting disease (2) Lingering death (3) Coldness of air . (4) Access of cool draughts of air (5) Leanness and extreme youth or old age (6) Exposure of body without coverings (7) Immersion in water, especially running water
- To Cadaveric hypostasis, or Suggilation —This postmortem staining of the skin is due to the fluid blood sinking
  under the effect of gravity to the most dependent parts of the
  body. It begins to appear a few hours after death (3 to 4 Tidy,;
  4 to 12 Mann), first at back of neck, chest, and calves as a
  dusky red discoloration. Hypostatic congestion indistinguishable from post-mortem suggilation may set in long before death.
  Professor Powell her seen staking hypostasis in marghine
  possoning, in plague, and in cholera two hours before death
- It can be distinguished from the true ecchymosis of a bruise by observing that (1) it is only in the most dependent part of the body, (2) it is not elevated above general level, (3) its margins are sharply defined, (4) its surface is not abraded, (5) an incision into it does not show clotted blood outside the vessels but simple staming. This distinction can be made even when decomposition is far advanced.

Cases—(a) Hypostans mistaken for marks of injury Lmp v Touchest fees-uons, 1898 Lt Col. Borah I M S, deposed that "the back of the head the back of the neet, the back of the buttocks, the lack of the thighs and of the call-cs were covered with brunes" such as might have been caused by bloss of a skick On cross examination he admitted he was unable to distinguish jost mortem hypostans from continuous Accused was necessarily as the continuous Accused was necessarily as the continuous Accused was necessarily as the state of the continuous Accused was necessarily as the continuous accused to the cou

(b) Three men left a puble bouse intoucated and quarrelling On the next moraing one of them was found expiring ne a vood, and he ded soon afterwards — I've surgeons deposed that they found the marks of numerous contusions all over the body, and upon that deposition the two companions of the deceased were committed and subsequently first All the trial, Drs. Boll and Tyle proved to the satisfaction of the ocut, that the trial, Drs. Boll and Tyle proved to the satisfaction of the court, that I produce the satisfaction of the court of the providence of the providen

See Bain Case in Appendix.

6 Cadaveric rigidity, or Rigor Mortis —This stiffning which occurs after the body has become 'cold,' is due to changes in the muscles on their molecular death. After sonatic death, the muscles prass through three strges, namely, 1st, relaxed with contractility, 2nd, 1grd and non contractile—the rigor mortis stage, and 3rd, relaxed with meighent decomposition.

In the 1st stage the muscles are relaxed, but contract on the applied tion of strubul. This stage in exceptional cases may last only a few minutes, or even be absent as in the case of soldiers killed in battle clutching their gains or swords and patical or kinters grasped in the hands of suicedes—this form has been called cadavene spasm (see p. 87). This relaxations lasts about three hours. There is no case on record where this stage has issted as long as twenty force hours. In Bengal, Mackanin found the average to be 1 hour 61 minutes. But the contract of the stage has been appeared by the contract of the contract

In the find stage that of cadaverse nightly or rigor morts proper, the muscles become night, partly from congulation of myorn All nusules, bith involuntary and voluntary, are affected, and the nightly occurs independently of nerve influence (paralyzed limbs becoming rigid unless complete degeneration of the muscles has taken place), and in dependently also of the rate of cooling of the lody "I is leastered by dependently also of the rate of cooling of the lody" I is leastered by Herin Case, App 1) such as violent imacular exercise or exhausting disease. Yet arrestrate, may receipt yet out for incillar printipalization receipts.

The time of onset of cadaveric changes in India is different from in Europe.—As the time of onset of the cadaveric changes is of great importance in fiving the time of death, and there were no data on record for India. Dr. Mackenzie undertook in 1883, a series of observations to ascertain these points, the results of which are here summarized

SUMMARY OF ONSET OF CADAVERIC CHANGES IN IRDIA !

		-		
Changes	Average	Larilest.	Latest,	Average for October of 10 caves
Muscular irritability lasts from death Rigor mortis begins duration [Green discoloration appears], Ora of flice appear Moving imagents appear [Vesications appear Evolution of gaves	hrs. mia. 1 51 1 56 19 12 26 4 25 57 3J 43 49 34 18 1"	0 30 0 30 3 0 7 10 3 20 21 18 35 0 5 50	hrs min 4 80 7 0 40 0 41 0 41 30 76 0 72 0 84 30	hrs min 1 42 1 10 81 50 24 16 81 21 59 8 29 17
to examination				<u> </u>

The changes were observed in the bodies of persons dving in hospital in Calcutta mostly from chronic diseases 2 Thirty six cases were examined between July and September with an average aerial temperature of 85 5° F and 10 cases in October with an average air temperature of 81 8° I' It will be seen that, as was to be expected the data differ considerably from those made by Casper in Berlin and by other observers in Turopethe changes generally occurring considerably earlier in India owing to the heat and humidity

# Time of onset of Cadaveric Changes in India.

This is very variable. Sometimes it commences within a few minutes after death, under the conditions above noted but usually in temperate climates it begins 5 to 10 hours after, and takes about 2 to 3 hours to develop <sup>8</sup> In India owing to the climate and to the body becoming 'cold' more quickly, it usually commences 1 to 2 hours after death, and takes 1 to 2 hours to develop

<sup>1</sup> Based on Dr Machenzie's data for July to September 1889

Millard on Dr. Machenier stata for July 10 September 1899
Ind McG dar 1889 p 1610ly developed before the ond of the seventh hour after death in 92 out of 115 cases (Tidy Leg Mcd I p 02) Taylor (3rd Ed 1888 I 513) gives 5 to 6 hours from death for agor invits to set in 6 to 24 for its combinance or 21 to 30 hours from death on an average Tidy gives 5 to 6 hours and from 36 to 48 hours respectively or 27 to 54 hours from death on an average Dut in sudden death in a muscular subject for hamorrhage rigor mortis may continue for 14 days or longer (Tidy, Leg Med I 71) The figures apply to a cold climate

Onset of Rugor Mortis —Of the 36 cases observed by Mackenzu in Calcutta in July to September the earliest onset of repor mortis was 30 minutes, the latest? hours and the average 1 hour and 56 mins. In 6 cases it was from 30 minutes to 1 hour in 10 cases from 1 to 2 hours in 5 cases from 2 to 3 hours in 2 cases from 3 to 4 hours, in 3 cases from 5 to 7 hours.

In cases where just previous to death the muscles have undergone great fatigue and also in cases where the irritability of the muscles has been exhausted by a powerful electric discharge, as in death from lightning stroke also in death from cholera tetanus possoning by opinion or stry-domity, nightly may come on at once and the body stiffic in the position it lives in at the time of death. On the other hand in cases of sudden death except from hightning rigidity comes on late, provided dawys of course that the muscle; just previous to death have not been subject to great fatigue or to anything tending to changes the contribution.

Duration—This depends greatly on the state of the miscles at the time of death. Generally speaking the sooner rigidity sets in the soner it parses off and the longer it is in appearing the longer will it list. It averages 24 to 48 hours in temperate climates (Tidy) but may continue for several days. Cold tends to prolong and heat (probably) to shorten it For India Br. Mickenziell observed the following times. Of 36 cases the shortest duration was 3 hours the longest 40 hours while the average was 19 hours and 12 minutes. In 3 cases it tested less than 5 hours, in 6 cases from 5 to 10 hours in 3 cases from 10 to 15 hours, in 6 cases from 5 to 20 hours in 14 cases from 20 to 30 hours, and in 4 cases from 30 to 40 hours.

Order of onset and disappearance.—In Europe thus rupity appears list in muscles of lower jaw 2nd in face need and trunk and lastly in limbs and it disappears in the same order. In Bengal in the raws it appeared in the majority of cases List in lower jaw and need, simultaneously 2nd in back muscles 2nd upper limbs 4th lower limbs and 1st disappeared in same order.

Case —Time of death determined by rigor mortis.—Case of Jessio McPiterson (Glasgow 1862) 1cg v McI ard lan —The body was first seen by Dr. Maeleed on the night of the 17th July 1c. in madaminer when the mean temperature of the air was 50° ½. "The rigor mortis was present in all the articulations but it was then depart ing. The body was perfectly cold even on the althourn and at the fluxures of the joints. There were no signs of decomposition and the temperature was usually cold. By 10° as on the next day, rigor mortis had disappeared from all the joints except the knees and the ankles Death had resulted from volence and from profuse hemorrhage. The

Brinton Amer To ir of Ved Soc. January 1670

victim was free from disease Rigor mortis sets in generally from 10 hours to 3 uans after death. When however, death has been sud len and is due to violence it sets in more slowly, and Macleod therefore considered that in this case at least 48 hours must have elapsed from the time of death until the rigidity set in But when the rigor mortis sets in slowly, it lasts all the longer and tice tersu the average period of dis appearance being from 21 to 36 hours. He therefore considered that in this case the rigility must have lasted 80 hours, and, putting these figures together (48 and 30) he arrived at the conclusion that about 8 days had elapsed since death. The evidence subsequently recorded proved, as nearly as could be that this was the time which had passed between death and the examination of the body -Taylor 3rd Ed I p 85

See also Gardner s case and Su lhabode Bhattacharn s case

Cadaveric spasm, or instantaneous rigor mertis is a term applied by Taylor and others to rigility which in rare cases occurs at the moment of death in sudden deaths. This rigility passes sooner or later into rigor mortis though not unnecessarily identical with it. It is usually muscular contraction. Very rarely important evidence as to the cause of death may be lerived from the presence of objects in the hands under the influence of calavere spasm but the ofject is not usually graspe I as the fingers usually relax after leath

Case -Alleged fabrication of evidence of suicide - A man trie! in I rance in 1835 narrowly escaped conviction as the murderer of his father The latter had been found dead in a sitting posture with a recently discharged pistol in his right hand the weapon resting upon the thigh in such a way that the slightest motion of the parts would apparently have causel it to fall. It was assumed that the son had produced the mury to the face which had been the cause of death and had afterwards placed the pistol in his father's hand in order to induce the supposition of suicile. The medical evidence by showing that the grasping of the weapon coull not have been simulated after death lead to an acquittal 1—Ogston M J I ect 365 See also case of Dip v Sudhubo le Bl ittacharpi

With the disappearance of rigidity, the 3rd stage of relaxa tion, due to incipient decomposition, commences, this softening is not necessarily putrefactive, as micro organisms are not always found in the relaxed muscles in this stage

7 Putrefaction, General -This condition, which begins when rigor mortis ceases is the most absolute and certain of all signs of death. It is the decomposition of the introgenous ch. elements of the tissues by bacteria (chiefly bacterium termo) with colour changes and the evolution of foul-smelling gases

n conduit our infect under time o	or or dealers of the		B	
Ante-mortem Gases	Post mortem Gases			
	Early	Later	Latest	
H	и,	CH	NH,	
CH,	CH,	CO.	co,	
co.	CO.	-	-	
SH,	SH.			
ο .	III,			

Ogston Brit For Med Ret 1857 303, Tidy Leg Med L 64

# The putrefaction changes occur generally in this order

- (a) Colour changes Externally a greenish spot appears on the addomen with olour of putterlaction and the eyeballs become soft and yielding Greenish disgoloration, spreads over body. It is due to destructive decomposition of the rid blood corquisels with the solution of their hismoglobin in the serum. In Calcutta during the runs, Mackenzie found that the latest period at which the green dissoloration of patiefaction appeared was 41 hours and 30 number, the enthest period was 7 hours and 10 minutes, and the swering period was 20 hours and 10 to 20 hours, in 10 cases upwarfs of 30 hours, and in two cases if was not observed at all 10 cases upwarfs of 30 hours, and in two cases it was not observed at 30.
- (b) Blatter form under the spaderms —Mackension a latest period for the appearance of vescations on the surface of the body was 72 hours the earliest period was 55 hours, and the average period was 49 hours and 39 minutes 1 in 17 cases 1 to occurred in from 35 hours to 48 hours, in 10 cases from 48 to 60 hours, in 5 cases from 60 to 72 hours, and in 4 cases it was not observed it at all.
- (c) Maggets appear. "The time of appearance of these is much earlier in India than in Furiop. The latest period at which simulative maggets (which are chiefly the larse of the house fly and flies of the "bine bottle," Calliphora y) appear was in Mackennes excessed it bours and 20 minutes, the earliest period was 3 hours and 20 minutes, and the average period was 25 hours and 67 minutes.

The latest pened of the appearance of the seature or moving maggots was in Mackenne's cases 76 hours, the earliest pened was 24 hours and 18 manutes, and the average period was 59 hours and 48 munites. In 6 cases it occurred in from 24 hours and 18 munites to 30 hours, in 16 cases to control in from 25 hours and 18 munites to 30 hours, in 16 cases from 25 to 48 hours, in 11 cases from 25 hours, and in two cases it was not observed.

(I) Post mortem emphysema -Gases distend cavities and tissues till the walls burst open and discharge their contents, and the brain runs out These gases, developed under considerable pressure, cause various characteristic awellings and displacements of organs and their contents Thus this gas (1) Puffs up features, rendering recognition increasingly (2) "Causes the eyeballs and tongue to protrude" (3) "Puffs up the tissues of the neck which become greatly swollen, accentuating the natural groove which becomes pale and exsanguine from the mutual pressure of the swollen folds, frequently giving fise to an erronious diagnosis of strangulation (4) Distends the abdomen, causing the boly if sul merged in water to float, causing the anus to gape, the freces to be expelled, the rectum and other viscers to prolapse, eventually bursting open the body cavities (5) Forces the contents of the stomach and lungs to escape from the mouth, often in the form of frothy and bloodstained mucus (6) The pressure, before the abdominal wall gives way, drives the blood from the abdominal vessels into the vens cava thence into the right side of the heart and into the lungs. Hence, other things being equal, the weight of the lungs gradually increases after death. In a large series of autopaies Powell has found the average weight of the Indian lungs to be, Left, 121 or , Hight, 14 oz , when the autopsy has been performed within four hours of death Left 174 oz , Right, 19 oz , when the autopsy has been performed over 18 hours after death (7) If there be a wound on the body, whether ante mortem or post mortem from the nibbling of rats, insects or crustaceans, the gaseous pressure will cause

post mortem bleeding from the veins. This explains the origin of the amerith orded in which the corpse was supposed to micrationally bleed in the presence of its murdicer. (8) In the case of females there may be post mortem delivity of the fetus up to the sixth month, and in eases where the os has already dilated and the female has died in labour, even a full term child may be delivered by the gascous pressure. The uterms in the latter case is usually turned completely inside out. In the earlier stages of pregnancy the complete uterms containing the fectus may prolapse.

Trom the above description it will be seen that gaseous decomposition.

gives rise to conditions in the eyes, tongue neck and anus, popularly associated with stringulation. The greatest caution must therefore be exercised in giving an opinion that death was due to strangulation if the

body is first seen after greeous decomposition has set in

It is to be feared that many a miscarriage of justice has taken place from ignorance of the natural processes of decomposition in hot chimates

(e) The aftened flesh falls from the bones.—The brain, liver, spleen, storanch, and intestines putrefy most rapidly, the heart, large, kidneys, bladder, and blood vessels more slowly, the last organ in women to putrefy is the uterus.

Onset and rapidity of putrefaction.—This is so rapid in the hot plains of India that it visibly begins in about 25 hours, but no definite estimate can be given of its rate of progress. In Europe in summer it occurs within 1 to 3 days after death 1 tis hastened or delayed respectively by the following conditions, affecting the growth of buttern or animal organisms.

(a) Temperature—The temperature most favourable to putrefaction seems to be between 70° and 100° Γ. hence bodies putrefs more rapidly in summer than in winter. Low temperatures below 32° Γ arrest putre faction allogether, hence nell preserved bodies of mammotist are found burded in arctic rea after thousands of vears. Temperatures over 100° 1 tend to delay it, and a temperature of 212° Γ arrests; it entirely

(b) Access of air.—Free access of ordinary air promotes putrefaction owing to entry of bacteria of decomposition, bence tight fitting clothes, or a tight coffin related putrefaction, whilst a bruised or mangled body putrefes more rapidly. Bodies putrefy more rapidly in air than in water, and less rapidly in eart than in water.

(c) Mosture — Voosture promotes, and absence of mosture retards, protrelaction. Hence, pottrelaction is more rand in most than in drv ar and is much retarded by submersion in water, when the chemical change into adipocer may occur, see below Bodes, however, after removal from water very rapidly decompose 'Mummufication,' see p 91, may occur in hot dry an unit.

(d) Condition of the body, age and cause of death —Putrefaction is more rapia in bodies of persons dyng suddenly and in fat, flabby or dropveal bodies and in newly born children and in women dyng in child birth than in cases of death from exhausting diseases and in emeated bodies, doubtless owing to excess of fluid in the former cases Parts in the control of th

in the hody of certain poisons, e.g. arsenie, antimony, chloride of sine and phosphorus, tends to delay putrifaction. Towell's experience is that in alcoholic poisoning decomposition is rapid

(c) Antiseptics and poisons—These, of course, retard put-election—arsenic, antimony and alcohol amongst poisons—Lime, contrary to the popular belief, retards put-relaction

#### Adipocere.

Sometimes instead of the decomposition of putrefaction, the corpse may undergo the post-mortem change of (1) Saponification,

forming Adipocere, or (2) Mummification

This saponification change only occurs in the case of bodies wholly submerged in water or cesspools, or buried in deep moist graves. The substance then formed is chemically a soan of ammonia and lime, and is called 'adipocere' on account of its fat (adeps) and waxy (cera) appearance is probably produced by the fatty acids of the fat combining with the ammonia of the decomposed nitrogenous tissues of the body, and latterly as time goes on part of the ammonia is replaced by lime Physically, it is a soft, wavy-looking substance, greasy to the touch and varying in colour from a dull white to dark brown and of a disagreeable rancid odour. On fracture it exhibits traces of fibres and the blood vessels between which the soap is deposited. Its specific gravity is less than water, it melts at about 200° I, is soluble in ether and alcohol, and on heating with caustic potash it yields ammonia. It is a very permanent body and may last twenty years and upwards The subcutaneous fat and bone-marrow first undergo this change . the normal internal organs are not often so altered.

Time required for the change—Observers in Furpow were of opinion that a low templerature by retarding decomposition favoured this change. Taylor and Casper show that adipocere has been found in bodies immersed in water from five weeks to one year but rarely in less than three to four months, and all the soft parts laid not completely undergone this change after a year's immersion. The process occurs more, slowly in damp soil than in water, though in the case of a foctus buried in a damp cellar it occurred in three weeks (Casper). The bodies of children and obese persons are more rapidly converted on account of the excess of fat, and in the former case the fat contains three times more fatty and with less olen and

In India, however, Dr Coull Mackenzie, police-surgeon of Calcutta, has recorded eight cases (I M G, 1689, 42) in which this change seems to have occurred within three to fifteen days

after death, thus apparently disproving the theory that a low temperature conduced to this change These cases occurred in the submerged bodies of persons drowned in the Hughli river at Calcutta, or buried in the hot damp soil of Lower Bengal

Cases -(a) A male Hindu was killed in July by the kick of a horse, and was buried the following day Four days after burial, the body was exhumed in order that an inquest might be held. It was found in an advanced state of suponification externally the heart and liver being also supomfied. The body was buried in soft porous soil saturated with moisture, the temperature being high in the rainy season (b) An adult Chinese woman alleged to have died in child birth was buried in Set tember under circumstances which necessitated an inquest body was exhumed seventy six hours after interment when it was found to be considerably saponified. Her body was I uried in similar soil and température, and in a wooden coffin (c) \ young I propean was drownel in the river Hughli in September his body being recovered seven days after It was in an advanced state of sanonification externally. the lungs, heart liver kidneys stomuch and intestines were also saponi fied and what is very curious is that the stomach contained undigested food (flesh and potatoes) of which the flesh was entirely saponified, the potatoes not being altered in the least (i) \ I uropean sailor was drowned in the Hughli in October and his body recovered eight days and ten hours after immersion was found to have the external parts as well as the heart, liver spleen kidneys stomach, intestines and bladder Raponified

Similar experiences have been subsequently recorded 1 from Bengal, in which the body of a young Bengali woman buried in September three feet deep in alluvial soil on the bank of a pond when exhumed three weeks afterwards was found to have undergone apparent saponification. And in another case, the body of a boy, nine years of age buried in a shallow grave covered with nine inches of water, was found to have undergone this change four days after death

For a recent thoroughly ascertained case of rapid adipocere reported by Professor Powell of Bombay and supported by chemical analysis, see Appendix VI

Mummification, or desiccation or shrivelling up of the body, by its losing rapidly its fluids -This occurs only in hot dry climates with hot air in motion, such as in sandy desorts, eg. Sindh, Beluchistan etc , and parts of Upper India where the bodies are perched in trees or between the rafters of a roof

#### Practical Examination of the Dead Body.

The clothes of the body should be examined before removed for the detection of signs of a struggle, marks of blood, etc., to enable comparisons to be made with injuries on the body the clothes are removed before being seen by the examiner, postmortem rigidity will be destroyed in parts, abrasions or bruises

Dr Moir, Ind Med Gaz , 1897, p 197, and Dr V Ashe, td

may be found and even the contents of the disturbed stomach may be forced into the mouth or larynx so as to give suspicion of accidental chokun, First the general conduction of the chould be noted e.g. whether showing marks of fire, or corrotion or wet or stained with blood dirt sceretions or exerctions. The clothes, etc. should then be more particularly examined note should be taken of any cuts or tears upon them and of the correspondence or otherwise of these with wounds on the body. Any peculivaries of the clothes or of the ornaments found on the body likely to aid in establishing its identity should also be needed.

### External Examination of the Body itself.

For this the clothes should be taken off and any marks resembling bruises washed to make certain that it is not dirt or external stains. In India dead bodies are often submitted for examination in an advanced state of decomposition. Such todies should nevertheless be examine t externally and as far as possible internally also, the fullest possible evamination of the body should invarially be made not necessarily for report to magistrate but for inclusion in your own notes for reference, and to establish your own opinion. The plan of making a partial examination is only admissible when the body is extremely putrid and decompo ed but even in such cases although the medical officer is at liberty to decline to make an internal examination of highly putrid corpses some distinct evidence as to how death was caused may often be obtained as for example when this has been the result of wounds fractures a or other violence or of the administration of certain poisons. besides the condition of the uterus might give vital information . and the presence of solil feces in the gut would negative alleged death from cholera

External examination of the body should include a search

1 Signs indicating the Time elapsed since death—That is whether the body is warm or cold its condition as regards rigidity and the extent to which purterfaction has advanced. It is possible that an estimate formed as to the period which has clapsed since death may bear greatly on the question of (a) the identity of the body and (b) the guilt or innocence of accused persons (see case below).

The question of how long a bod, has been dead is some times of the utmost importance in cases of murder where

accused pleads an alibi.

The advanced state of putrefaction of a body may show, for example, that death must have occurred at a period considerably anterior to the date of disappearance of the individual whose body it is alleged to be, or as in the following case of Gardner the condition of the body of a murdered individual may show that death must have taken place at a time when the accused had access to the victim, and not subsequently to the time of termination of such access

Care—Time of murder indicated by condition of body—Gardiner, the sweep—Gardiner lived with his wife and another woman, their servant. The wife was found dual in her belroom with wounds on her throat, at 8 a.m. Her extremities (which were uncovered) were cold and rigidity was well marked. The circumstances of the case conclusively indicated inurder and Gardiner was suspected and brought to final. Gardiner was proved to have left the house on the morning of the nurder at 4 a m and was absent until after 8 a.m. The defence alleged that the woman was murdered durin, Garliner a absence. The medical witnesses in the case gave it as their opinion that from the condition of the body when first seen at 8 a.m. it was clear that the woman had been dead more than four hours. Hence she must have due before Gardiner left the house. This and the other evidence in the case led to the conviction of the pranoner—Fallor M of Jur I 53.

See also case of bu lhabode Bl attacharu

Any estimate, however based on post-morten examination must necessarily be only approximate. You should consider especially the following points —

- (c) Temperature of the body —In the tropus where the temperature of strenuming objects is but fittle above that of the body the latter 'cools' in a few hours. Observations in temperate climates show that the dead body cools down to a temperature a little above that of the external air in fifteen to twenty hours the fall of temperature being more rapid in the earlier than in the latter hours after dead;
- (b) Conditions of the muscles—If these are claxed and contractile its probable that not more than 14 to 19 hours in the plains or 3 to 6 hours in the hills have elapsed aime death. If rigid probably more than 3 and less than 36 hours have elapsed in hills, for plains see table, p. 85.
- (c) Amount of putrefaction Other things being equal, the greater the amount of this the longer the period which has elapsed suce death The rapidity of putrefaction however, varies so greatly with the circum stances already detailed that no general rule can be faint down for estimating by its amount the length of time which has elapsed since death occurred.
- 2 Marks of violence, or other external marks indicative of the cause of death—Note if there are any stains of blood, or other matters, on the surface of the body. In the case of blood stains, it is specially important to note their situation and form, as this may show that they have been produced by some individual other than deceased, eg the impress of a right hand

on the right hand or forearm of the body or abrasion from violence (finger or other pressure, falls, etc.) Examine for marks of powder-grains or burns of powder in gun shot wounds. marks about mouth (poison or suffocation), marks of a hypodermic syringe, burns, however trivial. Specially search for bloody thumb- or finger-prints (see p 56) Note whether or not cutis ansering 1 is present, and whether any matters are sticking under the nails. Note whether the features are pale and natural or livid and swollen, the condition of the eyes, and position of the tongue, and whether or not this shows marks of murs from the teeth Examine the orifices of the body for presence of foreign bodies, marks of concerled punctures, and marks of corrosion, and note the nature of any fluid oozing from them Examine, at first without dissection, the whole body for wounds or contusions, not omitting to examine by palpation the bones for fractures and to search for marks of concealed punctures under the breasts, scrotum, and evelids and in the armoits and nane of the neck and in the cases of infants, in the fontanciles, and along the whole course of the spine

Then employing such dissection as may be requisite note in regard to all wounds, fractures or other marks of injury (1) Lyact situation -This should be recorded with reference to some fixed point on the body, eg distance of a wound in inches from the top of the pubis or sternum, angle of the jaw, etc. . position, with reference to hyoid bone or laryngeal cartilages of a ligature mark on the neck, etc (2) Exact dimensions, e a measured in inches, the length, breadth, and depth of wounds, breadth of lighture marks, etc. (3) Direction, eq in a punctured wound, whether it is directed from above down or below up, and whether from right to left or left to right, and in incised or other linear wounds or marks of injury, whether or not one end is higher than the other and, if so, whether the upper end is anterior or posterior to, or to the right or left of, the lower In the case of certain fractures, eq of the ribs, note whether the broken cuds of the bone have been driven inwards or outwards, by the violence used to cause the fracture. (4) Appearance and how for this indicates (a) the method, and (b) the time, of their production Under (a) note, in the case of wounds, whether the edges are contused or lacerated, or apparently clean cut, and in the latter case examine them with the aid of a lens for signs of tearing, or appearance of inversion indicative of production by a blunt weapon. Note the general shape of any wound, contusion, or burn, this may indicate the shape of the weapon or heated object which has been used.

In the case of an incised wound, compare the appearance of the two ends of the wound, with the view of ascertaining the direction in which the cutting instrument was drawn in producing it In gunshot wounds, if two orifices exist, compare their appearance, noting any characters indicating one or other to be the ornice of entry or of exit Note also whether or no any blackening or marks of gunpowder exist round the wound Examine any wound for the presence of foreign bodies, preserving such as may be found Under (b) note, in the case of wounds, whether or no the edges are retracted or averted, and whether or no blood or blood clots are present in the wound, or signs of inflammation exist around it. In the case of apparent contusions, note if the skin over them is abraded. examine the edge of the contused surface for changes of colour, and, by dissection, ascertain if the underlying tissues contain extravastied blood so as to distinguish eachy mosis from cadaveric lividity In the case of ligature marks also, the condition of the tissues underlying the mark should be ascertained If the injury is a burn note the presence or absence of vesication about it, or of a line of redness, or signs of inflammation around it

Bear in mind, while conducting the examination, the characters which distinguish ante mortem from post-mortem wounds and burns (qt.) Recollect, also, that under certain circumstances putrefactive changes may simulate signs of etrangulation There may, for example, be protrusion of the tongue, due to such changes, and putrefactive swelling against a string loosely tied round the neck, may result in the production of a depressed mark, somewhat similar to that left by the

ligature in death from strangulation

In infants the external examination should, in addition. include examination for (1) degree of muturity, namely, length and weight, condition of the eyes, condition of the skin, nails, and scalp hair, and position of the middle point of the body and (2) live birth, or the reverse, eg exfoliation of the scarf skin, condition of the umbilical cord, presence of signs of intra-

uterine maceration (see 'Infanticide')

# III Internal Dissection of the Body,

After the external examination has been fully made, the internal examination by dissection should be performed as thoroughly and as soon as possible

Preliminaries -The warrant or authorization to perform a dissection should always be taken to "the simply because you have failed to find post-mortem appearances indicative of death from a non-natural cause. Again, you may find that death was due to a lesson, such as an effusion of blood into the substance of the brain, which may either have been the result of violence or of disease, and the post mortem appearances may do no more than indicate that the fatal lesson was more probably the result of one than of the other. In such a case your opinion should be a guarded one and be accompanied by the reasons which level you to consider it to be more probable that death was due to disease or to violence, as the case may be

The results of the examination should always be duly recorded at the time and on the spot, in a note-book kept for

the purpose

#### Death Certificates without Post-mortem Examination.

In respect to death certificates the State has entrusted the medical profession with very grave responsibilities, and it behaves every member of the profession to discharge these responsibilities honestly and honourably. The issue of every death certificate should be regarded by the certifying medical man as a very serious responsibility, and it is especially so whenever there is the slightest suspicion that the death may be Those deaths that are obviously "violent and unnatural deaths, or sudden deaths of which the cause is no known," must immediately be notified to the coroner, or the magistrate who in India performs the duties of coroner, and become the subject of his inquiry or inquest, in the course of which a post-mortem examination is usually made before a death-certificate is granted. All other deaths that occur are not so notified, but amongst them is always a considerable proportion with an element of legal doubt, in which a certificate cannot honestly be given without an autopsy. How are these cases to be dealt with?

If the doctor has strong and, as he believes, well-founded supprison that the death is unnatural, he should report to the coroner or police-surgeon at once without hesitation.

If there is only a slight suspicion (and it is desirable in the rubbia misses) that mediach man, ultimough not criminal

<sup>&</sup>lt;sup>1</sup> Cl. F 3 Smith in Trans Med Leg. Sec. 1912 pp 50 et seg. from whose important article much of this a advanced A. Mo. Dr. W. Vectort ind p 64 Gr. on the Coroner a control of all autopuses. In England no one but a coroner can logally order a positioner assimation in mightartee or justice can no 1t, and a judge could only do so by order of a coroner to hold an inoues?

detectives should cultivate a certain amount of wholesome suspicion or detective acumen in rigard to dethis) he may do one or other of several things He (1) may get permission for an autops; and do it on which he may be able to certify or may have to report to the coroner (2) he may be refused the autops; on which he may refuse to certify or may still certify con ditionally which is a weak move or (3) he may report his suspicions to the coroner or magistrate without asking for an autopsy

For example a frequently recurring difficulty in regard to a death certificate is when a ratent who has been tracted for chronic disease (\*\*\textit{\sigma} Bright's heart trouble bronchits phthiss etc) does suddenly a considerable time after the doctor has cessed to visit him and the former is asked to sign the

certificate

The question arises at what length of time after his last visit in such a case is a doctor justified in giving a certificate and when is it justifiable? One way out of the difficulty is for the conscientious medical attendant to refuse a certificate of the ordinary character but offer to write a letter to the registrar entering fully into the circumstances of the case and if he accepts this your responsibility is halved. The circumstances' which will vary in detail must contain the following (1) date and duration of your attendance upon the deceased and your views of his illness at that time (2) the circumstances under which and the reasons why (a) you cease I attending then and (b) you have not recently been in attendance (3) the circum stances I nown to you about his home surroundings-poverty wealth attitude of relations and anything you may have heard from neighbours (4) any efforts you may have made to obtain an autopsy and the mode and manner in which these sugges tions have been refused and details you may care to impart to him respecting the close of his life which from your own professional knowledge and experience may have led you to regard his death as natural or unnatural Whatever action the registrar may take on this letter it remains evidence of reason \ able care on your part

The only other solutions are two namely (1) swallow all scruples and fill up a certificate taking care that your dates are scrupulously exact put in the wholly objectionable words as I am informed (but see below) and let the registrar take what steps he likes, and (2) refuse point blank to certify or write and then all responsibility rests between the registrar and coroner. The circumstances which compel you to one or other of these extreme procedures depend on the individual

conscience and the local colouring of the case

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If you decide to give a certificate without a post mortem

- you should observe the following points -
  (1) Re read carefully immediately before writing the certifi-
- cate the printed instruction thereof

  LL (2) Remember if you refuse a certificate without reasonable
  excuse you are hable to a fine—reasonable excuse
  here can only mean (a) Cases of uncertainty as above
  discussed, (b) Illness or accident on your own purt
  sufficiently severe to render you incaptible of writing
  or signing your name, (c) Rodity absence on your
  - any question of personal feeling between yourself and the decased or the messonger who comes for it.

    (3) Never under any circumstances whaterer give a duplicate certificate for a medical death-certificite is an original document accepted without question by renstrars and undertakers, and a surplus one may

part necessitated by professional urgency. It cannot mean the non payment of the bill for attendance or

and has been used for felonious purposes to perpetrate or hush up a crime

- (4) Only the man who was actually in attendance may sign the certificate, no one is authorized to sign on his behalf
- (5) Never sign a certificate in blank to be filled in by even a qualified person. It is grossly dishonest, illegal dangerous, and deserves heavy punishment when found out.

(6) Write legibly

- (7) Use the names of diseases in the "Nomenclature of Diseases
- (8) "As I am informed does not occur in the Act. The use of these words by an honest medical main in a death certificate is inconceivable, as they are in direct antithesis to the very idea of a death certificate, which means certain fixed positive knowledge, and hearsay is not recontized as such in law.
- (9) The distinction between 'primary and 'secondary' is a mere technical difficulty which can cause little more than temporary emburassment, when it is remembered that 'primary' here simply refers to time, and the certifier can use his discretion as to

how far back he should go

On the other hand, when there is the slightest suspicion that the death has been unnatural, and this includes not merely deaths by obvious and suspected personal violence, foul play, poison, criminal abortion, etc., but also by operative interference, a arresthetics, and all sudden deaths of which the cause is un known, it is clearly the duty of the medical man to report to the coroner or to the magistrate who in India takes his place, or to try all fair means of persuasion to get permission for an autopsy, and failing this to report to the coroner or magistrate Any private or unauthorized dissection of the body which may have the effect of hiding a criminal offence or culpable negligence renders the operator liable to be made an accessory to the fact should any question of foul play or malprixis subsequently arise <sup>1</sup>

#### Exhumation.

This unpleasant task becomes necessary occasionally where a suspicion of poisoning or other foul play arises some time after the death, or it may be for purposes of identification, as in the case of the body alleged to be that of Livingstone, where identification on disinterment was made by the arm showing a badly united fracture, such as the deceased was known to have had.

Case — Druce Portland Case Identification after 43 years' bural—
In this case, in 1907-09, a person mancel Druce claimed to be a not of the 5th Duke of Portland, who was not known to have been married three along the third the sale person of the first process of which he posed as Thomas Charles Druce, carrying on business as an upholsterer in Baker Street London Thomas Charles Druce was twice married, and had a family by each wife, and it was alleged by this grand son who claimed the Portland title and estate that the reputed death and burnal of T O Druce in 1864 at the age of 71, was a mock one and that the cofine outland merely lead Londer the orders of the police magis trate, Mr Plowden the vault at Highpate cemetery was opened, and the undisturbed and intact lead coffin was found to contain the body of an old man, who was readily identified as T O Druce. The well preserved state features over aleast recopined by previous acquimatances and by comparison with photographs taken during life. "The head was covered with scanty, reddist brown hart, somewhat whitened, parted neatly on the left sade, and brushed slightly over the forehead, the eyebrows thick and wary a moustache red tish brown dropped stragilt over the upper lip also whiskers and a beard. The skin was only broken in one part of the body, the lower abdomen, where there were indications of gangrene."

In India, the practice of swift cremation of mortal remains upon the very day of death which is prevalent amongst the more orthodox Hindus, who form the majority of the population, necessarily restricts the frequency of exhumations in this country, where earth-to earth burial is mostly limited to Mohammedans, non-Hinduized aborgines, and Europeans

Dr Wynn Westcott los cit, p 66

In exhuming a body it is desirable that a medical officer be present from the commencement also any relative or acquaint ance of the deceased person who can identify the corpse, and if buried in a coffin the carpenter who made the coffin should be present. The examination must be made in daylight, preferably the early morning Disinfectants or decodarnts should be ready, and should be sprinkled around but not upon the body itself. If the coffin is broken, and in cases where there is no coffin some of the earth above and below the body should be taken and preserved in cases of suspected poisoning for analysis.

The body should be exposed a short time before inspection to allow effluent to escape, and the observer should stand on the windward side. The stage of putrefaction should be noted

the windward side. The stage of patrefaction should be noted In recent interments the usual post-mortem exumination should be mude as far as possible. In the external inspection a sample of any characteristic hair on the face should be pre-served for identification. After examining the bodily cavities, the atomach and its contents also contents of bowels also the liver, spleen, and ladneys should be preserved and ecided in clean bottles for chemical analysis as detriled in appendix All impared parts should also be removed und preserved when practicable. When a long interval has clapsed since burnal, impures to the bones especially the skull and in women to the utrus (which longest resists putrefaction) should be looked for, and where mineral poison is suspected a long bine, of the femur, and the circle from the region of the abdominal cavity, should be preserved for analysis.

Limit of time for exhumation—There is practically no limit of time in English has to the utility of an exhumation For so long as the bones remain these may afford valuable evidence by which the innocence of suspected persons may be proved, or on the other hand the exhumation may prove nurder by arsence or other mineral poison. The Druce case, above noted, shows that the identity in an ordinary vault in a temperate climate may remain clear for upwards of half a century.

#### CHAPTER IV

# ASSAULTS, WOUNDS, INJURIES, AND DEATHS BY VIOLENCE

'ASSAULTS and wounds or hurt' form the greater portion of the cases coming under the medical officer's notice, and sometimes gate rise to questions of much complexity, and medical evidence is especially required in cases where the impuries result in death

Every attack upon the person of another is an 'assault,' whether it injures physically or not, and no provocation by word spoken or written can justify an assault, although it may somewhat intigate the offence Beating or wounding constitutes 'battery,' which includes the slightest touch of the finger Throwing a stone at a person but missing constitutes 'assault,' whilst throwing and hitting is assault and battery

The legal conception of a 'wound' is much more extensive than the surgical which latter restricts the term to an injury accompanied by a breach of the skin and evoludes contusions, simple fractures of bones and ruptures of internal organs. To obvide the use of this ambiguous term, and in view of the necessity for defining whether any particular injury is or is not a 'wound' is not defined by the Law, but the statute employs the terms 'hurt' and 'grievous hurt. Simple 'hurt' is thus defined — 'Whoever causes boddly pain disease, or infirmity, to any person is said to cause hurt' (P. P., s. 319)

Grievous hurt —The medical officer is often required to decide whether an injury is 'hurt' or grievous hurt'

The following kinds of 'hurt are designated as 'grievous hurt' (I P C, 8 320)

(1) Emasculation, (2) permanent privation of the sight of either eye (3) permanent privation of the bearing of either ear, (4) Privation of any member or joint, (5) destruction or permanent impairing of the powers of any member or joint, (6) permanent disfiguration of the head or face, (7) fracture or dislocation of bone or tooth, (8) Any hurt which endangers life or which causes the sufferer to be during the space of twenty days in severe bodily pain or unable to follow his ordinary pursuits.

Sometimes the healing of a simple wound of the scalp, etc., is deliberately delayed or prevented for twenty days so us to bring the severer penalty under this clause; so this possibility

should be kept in view.

When an act done by another has crused 'gravous hurt,' or 'hurt,' the deer of the act may be charged with the offence of voluntarily causing 'gravous hurt,' or 'hurt,' as the case may be, or according to the circumstances of the case, with the graver offence of 'attempting to commit murder' (s 307), or 'culpable homicide' (s 308), and causing hurt in such attempt

The kind of weapon used affects the gravity of the offence thus, by as 3.24 and 326 (IP.P.G.), the causing of hart or prevous burt by certain specified means is made an offence nore severely punishable than when such means have not been sed. Amongst the means thus specified are 'any instrument or shooting, stabbing, or cutting, or any instrument which, sed as a weapon of offence, is likely to cause death."

Deadly injury.—If an act done by mother results in leath, the doer of the act may be charged with the offence of ommitting 'culpable homicide,' or of 'causing death by a ish or negligent act"

Culpable homicide (a Scottish term, the English equivalent manslaughter) is defined in s 299 of the I P C., and the

Section 290 of the I P O is as follows — Whoever causes death by mg an act with the intention of causing death, or with the knowledge that is likely by such act to cause death, commits the offence of culpable mixede

Explanation 1 A person who causes bodily injury to another who is souring under a disorder, disease, or bodily infirmity, and thereby accelerates

doubt of that other shall be deemed to have caused his death.
Explanation 2. Where death is caused by bodily injury, the person who seed such bodily injury shall be deemed to have caused the death although resorting to proper remedies and skilful treatment the death might have

n prevented "Explanation 3 The causing of the death of a child in the mother's in its not bouncide. But it may amount to calpable homicide to cause

death of a living child if any part of that child has been brought forth, ugh the child may not have breathed or been completely born?

With reference to Explanation 2 of the above section, it may be pointed that it has been decaded in England that when a wound has been given high in the judgment of competent medical advasers is dangerous and the property of the property

accused may be convicted of this offence even if death followed as an indirect result of the injury (see s 299, Explanations I and 2). Culpable homicide according to the circumstrances of the case, may or may not amount to murder. Again, when a person has committed suicide, any one who has abetted him in doing so is punishable under ss 305 or 306 of the Code. By s 305 abstraint of suicide may be punished with death, if the suicide was under eightedn, or was insafine, delirious, or intoricated at the time. Attempts to commit murder, or culpable homicide, are punishable under respectively ss 307 and 308 of the Code, and attempts to commit suicide under sey a 309.

Death or hurt caused by a Rash or negligent act.—Where a person has caused the death of another by an act not amount ug to culpable homenoide, he may be charged with the minor offence of "causing death by a rish or negligent act" (\$3044) Similarly where a person causes hurt or grievous hurt to another, under circumstances which do not amount to "softun-tarity causing hurt" (\$7 P C, 321, 322) he may be charged with the minor offence of "causing hurt (\$337), or "grievous hurt" (\$338), by doing an act "so rashly or negligently as to endanger human life or the personal safety of others" In cases such as these, besides the main question, namely, has the injury caused, or is it likely 2 to cruse "death," grievous hurt," or "hurt 'a subsidiary question may also arise namely, is the character of the injury such as to indicate intention, or absence of intention, to cause a particular result?

## Examination of 'Hurt' and Wound cases

The police bring to the medical officer with the individual to be examined a printed form with the undernoted headings

<sup>1</sup> In India the question has a certain injury caused death? arises irrepective of the period intervening between the recept of the injury and death By the law of England a person is not deemed to have committed homicide if this period exceeds a year and a day (noticity of the day of receipt of the injury). This provision does not appear in the Indian Penal Code. Mayne India as a matter of evidence.
India as a matter of evidence.

\* It may be remarked that the opinion of a medical export may be required on the point whether an injury which has caused death is one which comes under the description of an injury sufficient in the ordinary course of nature to cause death. [Penal Code hos 200] or one which comes under the description of an injury 'lifely to cause death. [See 220 se whether the injury is one from which death with a class of the company of the company

to be filled up, and a note giving what the police state is 'all that is known of the case,' which is usually very meagre

Vainre of injury & whether a cut or bruise or a burn etc etc	2 Size of each inl my in inches in e, length breadth and depth	I On what pa t of the body inflicted	Slight serious, or dangerous	fy what kind of weapon inflicted.	Pemarks

The commonest weapon used in inflicting 'hurt' is the lathi or staff of solid hamboo which is used in about 32 per cent of all assault cases in Bengal and which being often bound with iron becomes a 'deadly weapon'. For the possibility of serious and even fatal injury without external marks of violence, see p. 113.

Besides filing in this form the medical officer should record in his own notes the detailed results of a thorough examination of the injuries with the view of answering all the various questions that may arise as previously mentioned. For the detailed Examination of wound cases see p. 11.3.

### Kinds of Wounds and Hurts and their Weapons

Wounds are usually described as —(1) incised, (2) contused and laterated, including bruses (continuent) and quasilot wounds, and (3) punctured To these may be added (4) internal injuries without any visible wound or visible breach of continuity of skin

- Incised wounds —In examining an apparently incised wound with the object of ascertaining the kind of weapon if any, used in producing it it is important to note (1) the situation of the wound, (2) the appearance of its edges, and (3) its length and depth in different parts
- (1) Situation —An apparently incised wound situated on a part where the skin closely overhes a bone or sharp ridge of bone, may be produced without a weapon or by a blunt weapon Blows with the fist, for example, over sharp ridges of bone such as the chin, or orbital ridge, or blows with a club on the scalp may produce wounds closely resembling mused wounds

Wounds caused in this way are generally, but not invariably, vertical to the bone

- (2) Edges.—These should be examined with a lens Shurp, or clean cut, uninverted edges, indicate the use of a sharp edged weapon, tearing and inversion indicate the employment of a blunt weapon, or production without a weapon
- (3) Length and depth.—Long morsed wounds indicate the use of a shutp-edged weapon and may either be caused by a single blow from one with a long tolerably struight edge, such as a sword, or by a drawing cut from one with a short edge, such as a razor. In the former case the neithoid of production is often indicated by the underlying bones being clean cut through, and in the litter by the wound tailing off at one end into a superficial scritch (see also (1) kind of weapons (2) direction of the wound).

The Weapons in Incised' wounds—The axe or hatchet class usually produce comparatively short incised wounds, either deep or accompanied by indentation and extensive fractures of the bones beneath. Cutting instruments with a concave edge and projecting point often cause linear wounds resembling a punctured wound at one end gradually decreasing in depth towards the other end. Or if the wound has been inflicted on a curved surface the puncture caused by the point and the incised wounds caused by the edge, may be separated by an unwounded portion of the skin.

Weapons of assault more or less commonly used in India sharped edged, and producing increased wounds are (1) short-edged high weapons such as the race (ustara) and the kinfe (churt) or (2) heavy short edged weapons of the hatchet class such as the are (kulk riv) and its garasi gandase or tarash an are like weapon with a long handle, and secrificial mile (khanda). Weapons allied to this class are the lone spade (phaora or kud (ti) and the Gurkha kulrı a short heavy, convex edged sword Killed and Samentions as belouging to the spade class the klurpa or grass entier a kinfe. (3) Long edged weapons, represented by the curved word (talrari), or the strapht sword (kirrich), and curved-edge weapons with a concave edge and projecting point, such as the bill hook (dao, kuch) and the widels (whand, a dwarket vid.). Wigardas swowd (tile, sexhels) (whand, a dwarket vid.). Wigardas swowd tile sexhels) (whand, a dwarket vid.). Wigardas swowd tile sexhels) (chang lass or china resemble incised wounds—one would search, for bits of class etc.

2 Contused and lacerated wounds —These are often the result of injury by means other than the employment of a weapon Thus they may result from (1) Injuries by broken glass—broken-glass wounds however, if slight, are apt to resemble meased wounds, (2) Falls on some projecting more or less sharp object, (3) Injuries from wild animals, or

(4) Machinery and railway accidents Severe contused and lacerated wounds are often accompanied by very little hemorrhage due to (a) shock or (b) bursting or crushing of vessels

Slight non-accidental licerated wounds, produced without a weapon, may be the result of injuries inflicted in forcibly terring out ornaments, or by the teeth or nails. If a wound of this class has been produced by a weapon, and much contusion or laceration is present, the indication, of course, is that a rounded or blunt edged weapon has been used. Sharp-edged knives, it should be noted, if used with considerable force, cause bruising and laceration of the parts divided 1

Gunshot wounds resemble contused and Incerated wounds in character, and indicate of course, the employment of a firearm, but not necessarily the discharge therefrom of a hard projectile If the wound is single, it may have been caused by a firearm loaded with powder and wadding only, if the weapon has been discharged near the body Nearness of the weapon to the body at the time of discharge is indicated by blackening of the sain from the gunpowder, except with cordite and modern gunpowder, or by scorching, charring or blackening of the clothes at the seat of injury A single wound, however, may be caused by a firearm loaded with a hard projectile, which in such a case will usually be found lodged in the wound, though a bullet may be so deflected by a bone, etc., as to pass round and out again by the entrance wound Iwo orthogs caused by the same discharge, indicate the employment of a hard projectile When two orifices are present, the orifice of entry will usually be found to be smaller and more depressed than that of exit, which latter is usually ragged and everted More than two orifices may be caused by one projectile, eg when this has entered the body after traversing a limb, or has split up aguinst a sharp ridge of bone into two pieces, each finding a exparate exit, or more than one orifice of exit may be caused by an intact bullet and a splinter of bone punched off by it A wound in the neck, produced by a thrust with a pointed perfectly circular hamboo was mistaken for a gun-

In the case of a shot-gun wound, if the distance from which the gun is fired is within 12 inches, the wound will, as a rule, be single, while beyond this each shot will make a separate wound,3 but it will depend also on the charge, size of shot, bore of weapon, and whether 'choke' or cylinder. A single pellet of shot may cause death by penetrating the aorta, or the brain through the eye Fatal wounds may be caused by

Ogston's Leets on Med Jur. p 420

<sup>&</sup>lt;sup>2</sup> Casper, L. 256

gunpowder and wadding alone if fired within about 4 inches from the body.

Contusions or bruises.—Under this term are included all degrees of injury produced by blows, kicks, or sudden pressure from explosions where the skin is not divided, ranging from a simple bruise on the surface of the body to one accompanied by fracture of underlying bones and rupture of internal organs.

In almost all confusions there is more or less extra asation of blood into the tissues constituting eachy mosts. The amount of blood effused is not entirely determined by the severity of the blow, but to some extent by the losseness of the particular tissues at the site of the blow, and by the condition of the ablood of the individual or the extensive effusion from a blow on the ôge, and the brunes produced by a comparatively gentle grasp on flabby women with thin skins

Ecchymosis shows itself as a dark dull reddish-blue discoloration of the skin, which in about twenty four hours begins to change colour, becoming lighter, and changing in tint to violet, then to green and lastly to yellow and finally disappears altogether in about fig. or six days. These changes in colour commence at the circumference of the patch, are due to varying degrees of solubility of the pigments into which the hæmoglobin breaks up, and to dilution of the effused blood by the serum of the cellular tissue and subsequent absorption, and occur only during life

Superficial ecchymosis —This appears within a few minutes after the injury, and is first of a blush black colour. When fiding it passes through the chromatic changes from the periphery of zones of brown green, and vellow, due to changes in the hymoglobul.

Deep echymoss.—This may not appear on the surface for several days after the injury, and not always directly over the site of injury Where there is yet no discoloration of skin, the effused blood may be detected by palpation.

Ecchymosis (c) may occur at a distance from the spot to which wo lence has been applied, eg at the seat of fracture of a bone broken by indirect violence, (b) may occur in spots (peteclise), and as large extrava sations indistinguishable from bruses, but without violence in some diseases, eg scurry, and some cases of snake poisoning, (c) other things being equal, is in amount less, the better the bodily condition of the cindwidate anyured, and genetar the losser the features of the star at the seat of minyr, leally, (d) its disappearance during life is apt to be extremely slow in old persons, is more rapid the better the bodily condition of the cultiferer. After death, it may disappear from, or be masked

by decomposition, or the application of antiseptic agents (e.g. charcoal) to the body
It may be absent in moral injuries, especially when the violence has
been applied to a yielding part, e.g. the anterior abdominal wall, as by a
blow or kick or the passing of a cart-wheel over the body. In the absence
of ecchymosis, the fact of the existence of an internal injury caused by

external violence 1s, during life, a matter of surgical diagnosis Affer death the existence of an internal solution of continuity may be secrtained by dissection and, in the absence of ecclaymosis, its connection with external violence is sometimes indicated by brusing of the parts lying between it and the surface. If such brusing is absent, as well as erchymosis, the question whether or not be solution of continuity discovered has been caused by external violence, may be a difficult one to decele, requiring consideration of points such as (4) the freedom, or other wass, from discover of the affected spate of the part of the surface of the part of the violence i and (6) the history of the case.

Cadavene lividity discoloration of the skin due to pust instress stain ing may, to a certain extent simulate exchinous, especially when this owing to the pressure of a sheet or other covering on the body, occurs in stripes resembling marks of flogging. It however (a) affects dependedly parts, (b) is usually of great extent and (c) is unaccompanied by extra vasation of blood. An incision through the skin and examination of the underlying cilliniar issue therefore will sinvays disclose the true nature of the discoloration. Attempts are sometimes made to simulate eachy the stripe of the discoloration. Attempts are sometimes made to simulate eachy the stripe of the discoloration of the stripe of the discoloration of the stripe of the stri

The weapon in contusions -If a weapon has been used, it will probably have been a blunt or rounded one, such as a stick or club Trequently the shape, etc, of the weapon or instrument employed can be inferred from the shape and situation of the patch or patches of ecchymosis Weapons commonly employed in India in the production of severe muries of this class are (1) a bamboo staff or club, often bound with iron (lathi or sonta), or when bound with iron (lohabandi) Harvey 2 mentions that about 32 per cent of the medico-legal cases reported in Bengal, etc. during the three years ending 1872 were laths wounds, and (2) the rice-pounder. a club usually of hard wood about 31 feet long, and 11 to 2 inches in diameter, shod at one end with a thin iron plate about 14 to 1 inch long This latter is a common weapon of assault in the Madras Presidency Instruments more or less frequently used in India in producing slight injuries of this class, requiring special mention are, (1) shoes-beating with a shoe is supposed to add insult to the injury, and (2) ropes or cords, used either for the purpose of tying up the sufferer as a mode of torture, or to secure the victim during the infliction of other injuries. Usually the arms are secured behind the back by bunding together the elbows or wrists The split-came (bet) used in Assam and Burma, for tying bundles, often makes a clem cut wound In the mangling form of torture by bamboo-crushing (bansdola) in which a bamboo on which men are

See injuries to the brsin, thorax, abdomen, etc. pp 119 et seq
 Bengal Med Leg Rep 1670-72 p 20

sitting is rolled backwards and forwards over the chest, there may be no external mark of violence or bruising yet the ribs may be broken and the lungs lacerated as recorded by Chevers

3 Punctured wounds.—Punctured wounds may be caused accidentally by projecting nails frigments of crockery, etc the ed\_es of the puncture are free from laceration or contusion the indication is that a sharp-pointed weapon has been employed Sometimes, but not always, the shape of the weapon which has been used is indicated by the shape of the puncture in the skin Dupuy tren found however that cylindrical pins produce elongated openings! The obliquity or directness of the thrust, and also the state of tension or relaxation of the skin, may affect the shape of the puncture and hence two punctures from the same weapon may differ in shape often also, owing to the clasticity of the skin a punctured wound is of less diameter than the weapon which has been used. Sometimes in a punctured wound the broken off point of the weapon employed is found. Punctured wounds are occasionally found in concealed situations eq in the rectum or vagina, in the armpit, or under the upper eyelid A minute puncture in certain situations eg over the fontanelles in infants, or in the nape of the neck may indicate a mortal wound The existence of several punctured wounds of course very strongly indicates the employment of a weapon and if all are similar in size and shape the probabilities are in favour of their being due to repeated thrusts with the same weapon

The weapons in punctured wounds used in India besides knives and weapons of the bill hook class afteredy mentioned are (1) daggers (kalari), of various shipes—in some of these the handle is transverse to the axis of the blade, (2) the spear (bhalam barch or sulfi), (3) arrows (tir), (4) such (hasua) Arrow wounds, it may be pointed out are frequently fatal

In Bengal, etc in the three years ending 1872 there were fitten fatal cases out of a total of twenty five The case below illustrates the great penetrative power frequently unparted to these projectiles. The pickaxe (gainti) hoe-fork (kanta ludali) may also cause a punctured wound probably with much contained, and punctured wounds may be produced by thrusts with a pointed bamboo

Case—Arrow wound—A Hindu female, aged fifty An arrow having first passed through the fleshy portion of the right forearm had penetrated the class between the eighth and minth rib. and was sticking in the body On opening the class the arrow was found to have passed through the diaphragm having slightly cut the upper surface of

<sup>&</sup>lt;sup>1</sup> Bengal Med Leg Rep 1870-72 p 416

the right lobe of the liver pierced through the lower lobe of the right lung and penetrated about an inch into the spine behind the heart and root of the lung. There was a large quantity of find and clotted blood to the right of the spine but the heart was uninjured —Ind Med Gas , 1875  $p \approx 237$  Dr  $\approx Manook$ 

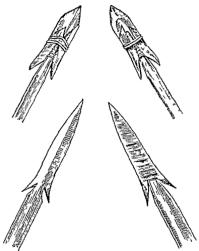


Fig. 11.—Poisoned Arraws of Aka Tribe (Half actual size. From a drawing by L. A. Waddell.)

Same weapon may cause wounds of different classes —A heavy weapon of the bill hook class may, for example produce all four varieties. Hence the existence on the body of the same individual of wounds belonging to two or more of these

four classes, does not necessarily indicate that two or more weapons were employed, or that more than one person was concerned in their infliction

Injuries by animals may produce wounds of any of the above classes —Injuries without visible solution of continuity, often severe enough to cause death are sometimes caused by elephants kicking trumpling on, or butting the injured individual or by the animal scizing the individual with his trunk and dashing him forcibly on the ground Apparently incised wounds may be caused by the tusks of the wild boar. Harvey describes such wounds as long clean rips, and mentions a case in which a wound so produced on the maide of the left thigh, was twelve inches long, three deep, and one broad and dry ling the femoral arteries, caused death by hamorrhage Fatal contused and lacerated wounds may be caused by various animals, thus they may result from a bite, or from a blow with the paw, or from injury by the claws of an animal of the tiger class, in which case the neck is often the seat of injury, or they may be the result of a bite from a crocodile or of an injury inflicted by a bear, in which last case the scalp is often found greatly torn Again, contused and lacerated wounds may be the result of injuries inflicted by domestic animals, e.g. a kick or bite from a horse or cow. Punctured and lacerated wounds may be caused by the tusks or more frequently by the horns, of animals. In Bengal, etc., in three years twenty cases of gores by horned cattle, ten of them fatal, were reported On the whole, injunes caused by animals are so characteristic in appearance that there is seldom any difficulty in deciding as to their origin

Gase — Kicked to death yet no external marks — A woman was kicked to death by her husband Her body was found by neighbours and a doctor called who reported no marks of violence and death probably due to natural causes A post mortem was made and the sternum found fractured in both places and two days later a second post mortem was made when extensive discoloration of the back noticed and thought at first to be pus staining. The discoloured patches were messed and substaneous extrawasations found which were traced to multiple fractures of the ribs about their angles. These fractures were not discovered at the first post mortem and it is therefore lid left if the sternum had not been fractured a crime would not have been suspected —I Crookshank, Trans Med Leg Soc., 1909, 19

4 Internal injuries without visible wound,—These may be accompanied by serious internal solutions of continuity, egg fractures of bones, or rupture of some internal organ (see p. 119, etc.) such as the spleen, and hence may be of any degree of severity. from extremoty shight to mortal wounds.

Casc —In 1884 when the meane Rajah of Kolapur died suddenly attent a struggle and fall from his keeper, it was found that several ribs were broken without any external marks

## Examination of Wound Cases.

The following points should be noted in all Wound Cases in the Living as well as in the dead.

1 Kind (incised lacerated, nunctured, bruised, etc.)

2 Anmber

8 Position on body

4 Direction and organ wounded ...

5 Size (length and breadth)

6 Depth

7 Edges and ends

8 Toreign bodies present

9 Hemorrhage amount 10 Inflammators reactions

11 Cuts and stains on garments

With reference to kind of wea pon (an I degree of offence) danger to life

With reference to self infliction evidence of struggle, kind of weapon, shock and hamor

hage, etc With reference to self infliction. danger to life.

With reference to danger to life, how inflicted

With reference to how inflicted, danger to life. With reference to danger to

life and self infliction With reference to kind of weapon

With reference to how inflicted, bits of glass hair, dirt, etc With reference to danger to life Noth reference to time inflicted

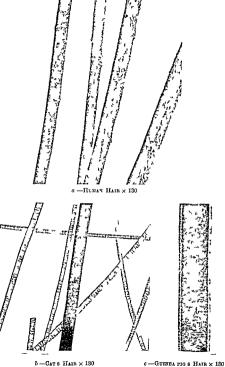
ante or post mortem With reference to kind of wespon, how inflicted, et-

In wounds in the Dead, in addition to the above, care fully examine and note down the appearance of the wound without disturbing the latter and photograph it if possible Note amount of blood effused and the presence of spirited blood stains on objects in the neighbourhood where the injury was recured Whether the blood is coagulated, and firmly so, presence of rigor mortis and post morten stains " Then the interior of the wound may be examined as to clots, and in stab cases the direction and depth explored gently by a blunt bougge, the deeper course of the wound is to be exposed by dissection without interfering with the external wounds which should be preserved for comparison with the alleged weapon, If a bone is injured, the injured portion should be removed as evidence

# Artificial Bruises in Malingering and for False Evidence.

The appearance of bruises and blisters is sometimes produced by malingerers or for false evidence in India by the application of the common weed Lal Clutra (Plumbago rosca or Zeylanioa)

Case - Artificial "Bruses" by Lal Chitra - In 1912 two undertrial prisoners, accused of murder, while confined in the Jhenidah Sub jail, brought a charge of torture against two constables and a Sub Inspector of Sailkura p s one of them complained of having been branded with a pair of hot tongs (chimia) and the other of having been assaulted. In support of the charge they showed marks on their persons
Mr Quarry, Superintendent of Police of Jessore, inquired into the



charge and was satisfied that no assault had been committed. The marks on the body of the prisoners were in Mr Quarry's opinion caused by the use of certain plants common in the locality-probably with the con nivance of the jail warders In support of this supposition he cited the following instances In 1911 when he was at Bhagalpur two prisoners, some three days after their admission to the Bhagalpur Jall, brought a charge of assault against the Police, and in support of their complaint showed some injuries The Jail Doctor and the Civil Surgeon were both of opinion that the marks on the person of the prisoners were caused by leating with a stick some ten days before the examination. The Superin tendent of Police in the presence of Mr Quarry marked thearm of a head constable with a see! (Latin name Semecarpus Anacardium, Bengali name Bhela) commonly used by Dhobis for marking clothes The follow ing morning the Collector, the Superintendent of Police, and the two doctors mentioned above met and the head constable was examined Both the doctors expressed a decided opinion that the marks on the head-constable were bruises caused by beating some ten days before the examination

Wr Quarry while at Jhemdah heard of a plant which, if touched, would leave a mark like a bruse. He sent for a stem of this plant and it was brought to him within half an hour which shows that it is a common plant and it not difficult to find. With the stem he just touched the forearm of a constable and within an hour there was a nasty looking bruse just as if the man had been struck with a cine. The days after he took the constable to the Curl Surgeon who assured Mr Quarry that the man must have been struck with some instrument like a cane about a week before the examination—I all Chitin produces such effects.

## Evidence from Foreign Bodies.

Foreign bodies found in the wound . such as broken pieces of glass, splinters of bamboo or other wood may indicate the means by which a wound was caused, also the broken off point of a knife or dagger, or the projectile or wadding or pellets of gunpowder of a hrearm. Deep punctured and gunshot wounds should specially be searched for foreign bodies of this latter description, and, if found, should be preserved for production in court, as they are frequently of great importance as links in a chain of evidence I or example, the broken-off point of a knife found in a wound, may exactly fit a knife alleged to have been used, or this may have a perfect point, showing that it was not the weapon employed. Again, a projectile found in a gunshot wound may fit, or be too large to have been dis-charged from, the firearm alleged to have been used, or a piece of paper or cloth used as wadding, and found in a gunshot wound, may correspond to similar fragments found in possession of the accused Foreign bodies are not always found in gunshot wounds; a projectile, for example, may have completely traversed the body or may have lodged and subsequently dropped out, as sometimes happens when the wound is shallow.

<sup>1</sup> Bengal Criminal Intellig Gaz , Feb 11 1916

or when a portion of clothing has been curried into the wound

with the projectile

For detecting foreign bodies in wounds and for the existence and particulars of fractures the Roentgen rays may be used X-ray photographs are admissible as evidence in medico legal cases, but the 'skingram radiograph,' being only a shadow picture is liable to distort the truth unless it is carefully made and its details are interpreted by skilled persons

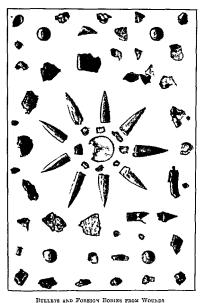
Thus rachitoc changes may simulate injury of bone and injury of bone not to be shown in certain planes. If does not show injury to the soft itssues. Radiographs should be taken in two different planes and at definitely marked distance. As evidence, the radiographs should have marked upon it the sale of the body and the part photographed and also the part of the body in contact with the plate. It is well to have a radiograph of the corresponding limb or part for 'control' purposes When a radiograph is produced as evidence the defendant should demand the privilege of employing expert testimony to explain its meaning to the judge and jury.

## Evidence from Alleged Weapon

The alleged weapon may affect the question of the guilt or innocence of the accused Thus the character of the injury may show that it could not have been caused by the weapon produced by the prosecution The alleged weapon should be compared with the wounds themselves and with any cuts on the clothes It should also be examined for stains of blood adhering fragments of hair, etc. If a firearm, it may show signs of recent discharge. Recently discharged firearms will be found blackened inside the barrel, from the residue left by the gunpowder after ignition This residue consists mainly of finely divided carbon and potassium sulphide, and yields to water a dark-coloured liquid, alkaline in reaction, and which, after filtration, strikes a black colour with a solution of a lead salt After a time the potassium sulphide becomes oxidized into potassium sulphate, rust (hydrated ferric oxide) also forming Hence, owing to the oxidation of the sulphide into a sulphate, washings from a firearm which has been some time discharged, may show no alkaline reaction, and give no blackening with lead salts The 'fouling' of the modern gunpowders, cordite, etc., is different. Again, the weapon alleged to have been used may show signs of recent fracture, or be bent or otherwise injured as the result of its use

## Wounds in Living. Is Wound dangerous to Lafe?

This information may be required in cases, especially where the question of ball is being entertained as ball cannot be



(After Major N Mackworth I M S ) [To face : 116.

granted where the probability of a charge for murder or

criminal manslaughter arises.

The Danger to Life primarily depends mainly on (a) the Amount of Hæmorrhage, (b) the Organ wounded, and (c) Shock; and secondarily on the probability of (a) Secondary Hemorrhage, (b) Septicemia, Erysipelas, Tetanus, and Scarring causing structure of esophagus, bowel, etc. There arises here also the question of pre-existing disease as a contributory factor.

On the question whether the wound is likely to leave any serious Personal Disablement, see chapter on "Insurance and Compensation for Accidents," though this information may also

be required in criminal cases.

# Wounds in Dead. Was Injury inflicted during Life or after Death?

Injuries inflicted after death, although often the result of accident, may also be the result of design, the motive being either concealment of a crime, or fabrication of evidence in support of a false charge. Further, the fact that an injury sewere enough to cause death was inflicted during life, is evidence in favour of its having been the cause of death. Hence the importance of this question.

Case.—Fabricating wounds and mutilating bodies of the dead.—
Decapitation is Jone by the rest of a gang to prevent identification in
cases of wounded or killed thieves ar related by Chevers, or the mutilation
may be done with a dead body to fabricate a false charge of murder
against a particular party. Thus in the Nisamat Adalat Report for
Bengal, Vol VI. 1856, p 834, and 1835, p 189, a case is reported from
Tirbut. The body of a deaf and dumb beggar who had duel of disease
was found fearfully hacked and cut, leaning against the house of a person
against whom the accused had a grudge. Four persons were convicted
by the judge, but were acquitted by the higher court. For some other
instances of mutilation, see Chevers. Med. Jur. 479 to 500.

Ante mortem injuries are distinguished from post mortem injuries by the presence of signs indicative of vital action. These may conveniently be considered under the heads of (1) Ecchymosis; (2) Effusion of blood; (3) Other signs

 Ecchymosis.—Contusions inflicted during life, if severe, are generally, but not invariably, followed by ecchymosis. Ecchymosis may appear oven if the individual has lived only a very short time after receipt of the injury; and further, ecchymosis from blows inflicted during life may not appear until after death has taken place. The presence of ecchymosis. however, does not necessarily indicate that the injury producing it was inflicted during life Christison found that blows inflicted on dead bodies, within two or three hours after death were followed by ecchymosis, not distinguishable from ecchymosis the result of blows inflicted during life. If the individual has lived for some time, say more than twenty-four hours after receiving the injury, changes in colour will probably be found at the circumference of the ecchymosed patch from purple to black, violet-green to yellow-thus affording a clue to length of time inflicted. Thus the purplish-black becomes by the third day violet, by the fifth day green and by eighth to tenth day vellow, and the injured part will probably be found swollen The presence at the circumference of the ecchymosed patch of changes in colour of the above kind and the presence of swelling of the injured part, show that the injury was inflicted some time before death

- Effusion of blood —In a dead body the blood remains fluid for some time after death, rarely beginning to congulate until four hours, and sometimes not until twelve hours, after death Hence an injury inflicted after death, while the blood is still fluid may be followed by effusion of blood. Owing however, to arrest of the heart's action no arterial spouting occurs, and the quantity of blood effused is much less than a would be effused from a similar injury inflicted during life. Further, blood effused from a wound made more than ten minutes after death, rarely coagulates Hence, marks of arterial spouting indicate infliction while the heart is beating. Much hemorrhage also indicates ante mortem infliction and if the blood effused is found congulated the presumption is strong that the injury was inflicted either during life, or very shortly after death Post mortem infliction is indicated if the effused blood is found fluid but not necessarily by the quantity of effused blood being small, seeing that severe contused and lacerated wounds, inflicted during life, are sometimes followed by but little hæmorrhage.
  - 3 Retraction and eversion of the edges of wound follow the infliction of an intested wound made during life or shortly after death. Wounds other than incised wounds, inflicted during life, exhibit this character in proportion to the closeness with which they approximate in nature to incised wounds. Hence in incised wounds, or wounds approaching in character to incised wounds, indications of infliction during life, or shortly after death, are —(a) retraction and eversion of the edges of the wound, (b) hemorrhage into the wound, and into the

cellular tissue around it; and (c) the presence of coagula In throat wounds, Dr. A Powell has remarked inversion of the edges in the wounds due to the retraction of the platysma muscle in the cut skin

#### SUMMARY OF ANTE OR POST MORTER INFLICTION

Discoloration at circumference	24 hours before, death		
Marks of arterial spouting Extensive homorrhage	Before death		
Coagula	During life or very shortly aft		
	1.2		

Retraction and eversion of the edges of the wound than three hours after death Ecchymosis

Signs of inflammation around injury \

Complete absence of all the above

er

Certainly before, and probably

I robably more than twelve hours

# Special Wounds according to Regions: Head Wounds.

Scalp -Contused and lacerated, and even apparently incised wounds penetrating to the skull are especially likely to follow blows from blunt weapons on the scalp Occasionally from such blows, the inner surface of the scalp is found ruptured without there being any rupture of the outer surface Wounds of the scalp only are not likely to cause danger to life, except from the supervention of inflammation and erysipelas Other things being equal these are more likely to follow contused and lucerated, than clean-cut wounds Erysipelatous, inflammation, although a common sequel of scalp wounds in temperate climates, appears rarely to follow such wounds in India On the other hand, the scalp may seem uninjured, yet the brain may be injured by fracture of the skull or concussion or hemorrhage

Skull.-Separation of the sutures without fracture may ocean, even in old persons from mechanical violence. Harvey records sixteen cases-one an old man of seventy-in which this was the result of lathe blows Fractures of the skull may be simple or compound, direct or indirect Simple fracture is a usual result of a fall on a flat surface, while fractures from blows with blunt weapons are, unless the head is protected by a thick turban or some similar covering, usually compound Fractures from blows with blunt weapons are in the great majority of cases direct, z.e. at the site of the blow Indirect fracture, z .. fracture by counterstroke, common as a result of falls, is comparatively rire as a result of blows with weapons. In fractures of the skull the danger to life mainly depends on the amount of injury to the brain, and other things being equal, the amount of such injury is likely to be greater, the thinner the bones at the seat of fracture. Hence blows on the Limple and punctured wounds of the orbit are specially likely to be attended with danger to life.

Gare—Pounding of skull—At Almora a robbery case 15 reported by Lt Col L A. Waddell in 1901 in which the skull of the victim was smashed in and almost pulpified by beating with a large stone

Sword-cuts of skull are especially common amongst the excitable Burmese who use their heavy cleaving dahs on slight provocation. In these cuts a shaving of the skull and scalp may be sliced oft or nearly so by a glancing cut, but the most serious are vertical wounds iracturing one or both tables of the skull and those accompanied by depression of the skull and injury to the brain substance. In the vertical wounds the inner table is frequently frictured although there may at first be an absence of head symptoms. One of the worst instances of extensive sword cuts of the skull is the Jhelum case, here cited

Case -- Multiple sword-cuts through skull and other bones. -- A trage ly is reported by Lt Col L \ Waddell from Jhelum in May, 1881, where he saw a sais (groom) caught red handed in the act of killing his wife and her paramour with an Afghan sword inflicting remarkably extensive cuts through bones in which the latter were sliced through almost as if they were cheese The wife endeavouring to save her paramour received a cut which bisected the left side of her chest from the spine to the sternum as if the thorax were sawn through in half cutting through the ribs spinal column and vertebra across left lung and into the heart The same cut also severed both bones of the right forearm above the wrist which had been clasping her paramour, and the hand was left hanging only by about two inches of skin. Death was instantaneous in a pool of blood Turning to the man the infuriated says dealt hun a cut at his head, which nearly sheed off the whole top of the skull with its contained brain, the cut extended from above the level of the eyebrows transversely through the skull and brum to the other side leaving only about three inches of the skull uncut to complete the circuit The same sword cut also cut into the man's axilla meising several ribs as the man had ducked his head and was protecting it by his uplifted arm After the man fell the sais nearly severed the remaining portion of the head from the body by two cuts one of which sliced off the angle of right lower jaw and the other cut through the neck down cervical The sword was one-edged and exhibited after the tragedy a somewhat sinuous edge, through being wrenched out of the cut bone into which it had become embedded The sais was a muscular, middle aged

man, who had no experience in wielding a sword. He made no attempt to deny the crime but pleade! provocation. He suffered the death penalty.

Brain -Injury to the brain frequently follows a fracture, especially a depressed fracture, of the skull, and, as stated above, is the main source of danger in such fractures Injury to the brain may, however occur without fracture of the skull, and sometimes results from a comparatively slight blow on the head. As in the case of fracture of the skull by counterstroke, the seat of the injury to the brain may be at a point opposite to the spot to which the violence was applied The brain injury may be a contusion followed by concussion An injury of this kind may prove immediately fatal or produce temporary insensibility, which may closely resemble intoxication, and be only distinguishable from it by the absence of alcoholic odour in the breath, or may produce only slight immediate effects, but be followed after an interval by inflammation, ending in death Guy for example mentions the case of a woman who received an injury on the head, and after remaining well for twelve days, fell ill and died with symptoms of compression, and also the case of a girl who, after a fall on the head, suffered simply from headache for six weeks, but died two months after the fall from brain affection. The injury may becompression caused by depressed bone effused blood or the products of inflammation The brain is specially likely to be injured by depressed bone, in punctured fractures, and in fractures in situations where the bones are thin

Effusion of blood on the surface, or into the substance of the brain may occur with or without fracture of the skull and may cause immediate insensibility, followed by death in a few t minutes, or, when the effusion occurs slowly, insensibility may, not set in for an hour or more The middle meningeal artery is frequently ruptured, as a common occurrence, with or without fracture of the bone, as a result of a fall or blow Often there is no immediate unconsciousness or only a momentary stunning after which the patient may walk many miles and transact his business Later, perhaps some hours later, effusion takes place between the dura and the skull, perhaps accelerated by some stimulant or excitement Coma sets in as a result of compression, and the patient dies unless surgically treated Coroners' juries frequently censure house surgeons who have failed to recognize such cases and to detain them in hospital Professor Powell has held autopsis on three such cases in the practice of one house surgeon who had not correctly diagnosed any of them Effusion of blood from violence without fracture

of the skull may or may not be accompanied by appearances of contusion of the integuments covering the skull If accompanied by such appearances the question may arise whether the effusion was the result of the external violence which gave rise to these appearances or the result of disease or excitement A similar question also may aime that it was where no marks of external violence are apparent, as effusions of blood from violence may occur without any external signs of injury being present. An effusion of blood from violence is generally, unless the brain itself be torn on the surface and not in the substance, of the brain It is commonly located unmudiately below the seat of violence, but in some cases is found at a point directly opposite thereto Lifusion of blood from disease or excilement is sometimes extremely difficult to distinguish from effusion cau-ed by violence From disease, however, effusion rarely occurs in persons under the age of forty, most commonly takes place in the substance of the brain and careful examination will generally disclose a diseased condition of the vessels Effection from excitement-alcoholic or non alcoholic-may occur in persons of any age. Signs of congestion of the cerebral vessels co existing with effusion, are to a certain extent in favour of di ease or excitement being its cause. It must further be pointed out that even if the probabilities are in favour of an effusion being due to violence, the question may still arise whether the violence was a blow. or the result of a fall Questions of this kind not infrequently arise in the case of a fight between intoxicated persons Blows are interchanged, the individuals perhaps are separated one of them is then seen to stagger and fall, becomes insensible, and dies Post mortem examination shows the cause of death to be effusion of blood on the surface or into the substance of the brain In such a case it is often difficult in the extreme to arrive at a definite conclusion on the question as to whether the effusion of blood was the result of (a) a blow received during the fight, or (b) excitement or disease or (c) the fall after the termination of the struggle Compression from the products of inflammation may set in and prove fatal several days or weeks after receipt of the injury

Lacerations of the hrair may be caused by a weapon or projectile penetrating the skull, or by fragments of depressed bone, or mry occur without injury to the skull, either immediately below or at a point directly opposite to, the seat of the violence. Wounds of the brain are, of course, attended by great danger to life. Very sevele wounds of the brain, accompanied even by loss of substance, may not cause immedrate

death, or even immediate insensibility, and in exceptional cases recovery may take place

Face .- Wounds of the face are not lakely to be dangerous to life unless the orbit is involved or the injury or resulting inflammation extends to the brain Injuries to the face by causing permanent disfiguration loss of sight, or teeth etc. often come within the definition of 'grievous hurt' Shitting or cutting off the nose is a recognized punishment for unfaithful wives, who after the operation are described as 'Nakti' or 'nosed' Often when the victim is a female the lips or breasts are also wounded but no other injury may be present, indicating either submission of the sufferer to the punishment, or the participation of several persons in the outrige. When the victim is a male the motive is commonly either sexual, or punishment for theft, or if the teeth have been employed the injury may have been inflicted in the course of a struggle, and indicate no special motive. Injuries to the nose and ears caused by forcibly pulling out ornaments are not uncommon, especially in females and may by causing permanent disfiguration, amount to grievous hurt In such cases the motive may either be theft, or desire to cause hurt Injuries to the eyes also are not uncommon and may be the result of direct violence, eg gouging out by the fingers or injury by a sharp pointed weapon the motive for infliction of the injury being similar to those leading to wounds of the nose or ears Or the injury may be the result of indirect violence and indicate no special motive As examples of injury to the eyes from indirect violence, it may be mentioned that blows with a club on the head sometimes cause rupture of the eyeball, and wounds of the evebrows are sometimes followed by amaurosis

Cases -Gouging out the eyes -In 1854 a very brutal case was tried at Mangalore in which the paramour of a murried woman becoming tired of her or jealous gouged out her eyes with a curved knife and a needle The woman recovered - Faujdar Adalat, 1854

Chevers gives a case of a man who gouged out both the eyes of his wife with his fingers and otherwise maltreated her, because she

declined to have connection with him being very young

In Macnaghten's Reports Vol II 427 a case is given of a man who, having tied the hands and feet of his wife, threw her down sat upon her breast and put out her eyes with a heated iron. In the case of bodies found exposed in the fields or jungle it should be re membered that the eyes are generally the parts first attacked by birds of prey

The loss of a tooth from a blow is a common complaint. but it is usually false and intended to establish a charge of 'grievous hurt' The knocking out of teeth is rather, reported India as the fist is seldom used for assaults. When blows are delivered over the mouth or eyes it is usually with a shoe. In false cases there will likely be no signs of muny to lips or guns or adjacent teeth although the alleged weapon is usually a thick laths or a large stone the cavity is usually old and contricted, and the teeth of complainants usually an old man or old woman are generally loose. The incisor tooth produced in such false charges is usually unhoken and old and dry 1.

## Spine and Spinal Cord

Generally the danger is in proportion to the extent of spine injured Death occurs instantaneously if the meddila and upper part of the cord be wounded I Serious injuries to the cord above the tind cervical vertebra are immediately fatal from paralysis of the muscles of respiration. Serious injuries lower down give rise to secondary effects from which death may follow long after the receipt of the injury. Injury to the spiral cord in occur without fracture or dislocation of the vertebra. A blow for example on the spine may cause concussion of the cord followed by paralysis or may set up inflam mation followed by softening of the cord.

Concussion of the cord sometimes results from a railway accident and in actions for damages in case whore this injury is alleged to lave been received the question whether the plaintiff's symptoms resulted from the accident or from disease or are pure malingering is sometimes a very difficult one to

deal wit

Frature of the second certical vertebra with displacement and immediate devth is a not infrequent result of a fall from a height on the vertex. If the bones or ligaments are diseased very slight violence may cause displacement and fatal injury to the cord and Taylor mentions a case in which displacement of the odontoid process and fatal injury to the cord appear to have been caused simply by the muscular effort of throwing the head forcibly back. Fatal injury to the cord from non accidentil violence may be caused without a weapor. Fatal fracture of diseased vertebrae has resulted in several cases from the well meaning but ignorant efforts of bonesetters. Fatal fracture—dislocation of the certical vertebrae—has also resulted from reprehensible horseplay in lifting up children by the head to allow them London. In Urdu to show them a deer or the children of the sur. Fatal injury to the

cord, unaccompanied by injury to any portion of the body other than the spine, is rare as a result of blows from blunt weapons, but may occur when the neck is the seat of the injury, and may even occur without any external marks of violence being present. In one of Harrey scases, for example a woman aged sixty was killed by a blow with a club on the neck. Death resulted from injury to the cord due to displace ment of the vertebre but no external marks of violence could be seen, although on dissection blood was found effused into the muscles of the nape.

Case—Laceration of cord without external injury—This is a brail way of causing death in this country especially in the case of children. The neck is twistel and dislocated causing laceration of the spinal cord. In 1860 a woman was con lemned to death at Combaconium for murdering a child in this manner for the sake of stealing his jewels There were in this case no external marks of violence—Madras Faujdars. Adalat, 1860.

Hacking the spine with a sword bill hook, or other heavy cutting weapon—causing sometimes decapitation—is a common mode of murder all over India and specially so in the Central Provinces, Oudh, and the Panjab

#### Neck Wounds

Injuries of this region from mechanical violence other than the use of edged weapons are chiefly dangerous to life from their effect on the spinal cord A case cited by Harvey. however, shows that mechanical violence may cause very extensive, possibly fatal injury to the soft parts in front of the neck without dividing the skin Wounds of the neck from edged veryous are often suicidal and often also homicidal In cut throat, suicide is more or less contra indicated, if the wounds are multiple, unless one only is severe, or if the wound is single and of great severity, more than sufficient to destroy life, or if the wound is low down on the neck Wounds of the neck vary in danger to life according to their situation and depth From the position of the large blood vessels lateral wounds are more dangerous to life than wounds in front, and wounds low down on the neck more dangerous than wounds high up Wounds of the windpipe only are attended with little danger to life Wounds of the neck dividing the gullet are almost always fatal Wounds of the large vessels are mortal injuries, death resulting either from hemorrhage, or from entry of air into the circulation Wounds of the carotide are not necessarily immediately fatal

Case - Survival in cut throat. - Chevers quotes a case in which a man, with the carotid artery divided, survived until the following day It appeared that a man was aroused in the night by two thieves, who were in the act of stealing in the house. In the struggle which ensued one of them cut him in the neck, and they escaped. After receiving the cut, he said that he had seen the prisoners, whom he named stealing his goor, that he had seized one of them, and that the other cut him on the neck with a dhao, or knife, and both made their escape. The accused not having come with the neighbours, were sent for and confronted with the wounded man who accused them as above. The man's brother stated that the occurrence happened late at night, and that it was then moonlight The man died the following day. The civil surgeon's evidence was as follows "I found an arregular deep wound on the neck. apparently caused by the sharp, pointed instrument, the wound, in my opinion, was not caused by the man's own hand, the carotid artery was divided, and deceased had bled to death. It is to be regretted in this case that it is not recorded whether it was the external or the common carotid arter, that was divided. If it was the latter, Chevers says that this is the only recorded case of so long a survival, but Taylor (ed of 1883 Vol I p 631) says 'There are several cases on record which show that wounds involving the common carotid artery and its branches, as well as the internal nigular vein, do not prevent a person from exercising voluntary power, and even running a certain distance

Case —Prof. Powell reports. "Ten years ago when draving to the Morgus. I observed a sentile going on about sixty sayds in front of me. A const tible came running in my direction holding a hudder, thet to his neck. I called out to him to nation to be abuseness master of running away from it and took his number to report him. About an hour later his ded bobly was brought to the Morgue. He had been stabled in the neck and had run a distance of 80 yards before he fell. I found the right common carotist severed in two thirds of its distances.

#### Thorax Wounds.

Penetrating wounds of the chest perforting the heart or one of the large vessels, are mortd, but not necessarily immedrately mortal, wounds In such wounds the rapidity with which death occurs grutily depends on the rapidity with which hemorrhage takes place

Wounds of the heart may be penetrating or non-penetrating according as they injure the wall or penetrate the cavity. Ninety per cent are penetrating. The chief dangers of the former are shock and injury to the coronary artery. A needle puncture rirely causes hamorringe from the ventricle, but from the auricle it does. Percarditis, endocarditis, and empyram are secondary complications. Loss of blood may occur compiratively slowly if a large vessel is only punctured, and the puncture is small, or if the heart is wounded, if the wound is small, or oblique in direction. After a wound of the heart is undividual may even survive several days. Taylor

mentions two cases, one of survival for eloven days with a bullet one-third of an inch in diameter lodged in the septam between the ventricles, and another of survival for five weeks with a mass of wood lodged in the substance of the heart Recovery may occur

Taylor mentions that out of twenty nine instances of penetrating wounds of the heart only two provel fatal within forty eight hours. In the others death took place from four to twenty eight days.—See cases of recovery cited by Powell, Ind. Met. Gaz., 1902.

Gase — Wound of heart — A case narrated by Mr William White of Rangoon — "t soldier was wounded in the storming of the Great Pagoda on 14th April 1852 The ball entered a little above the anterior fold of the left axilla taking an oblique direction to the cavity of the chest. At first he appeared to be doing well, and the wound closed Sub-equently his health declined, with feversh symptoms and evidence of pulmonary disease. A few days before his death it was noticed that the action of the heart was weak but natural it saysoble, or contraction and diastole, or relaxation regular and equal Ho died worn out and emaciated on the 24th June On examination, the bullet was found in the left ventrick of the heart in its most interior part — Chevers, Med Jur

Even when death occurs rapidly considerable power of locomotion may remain after receipt of a wound of the heart, as in the case already mentioned, where a man ran eighty yards after a stab penetrating the right ventricle. Taylor also mentions a case in which it is probable that a man ran over eighteen feet after a gunshot wound 'shattering to stoms' the auricles and part of the aorti. If the lungs are wounded, death may occur rapidly from hemorrhage, or after a time from inflammation, but wounds of the lungs are not necessarily mortal. A wound completely transitiving the chest other things being equal, is not more dangerous than a simple penetrating wound

Non-penetrating wounds and injuries of the thorax are dangerous to life in proportion to the amount of internal injury Serious internal injuries of this class are usually, but not invariably, accompanied by fractures of the ribs, but fractures of the ribs may be present without other internal injury. If a rib has been fractured by direct violence, eg a blow from a blunt weapon it is usually found broken in one place only, and the ends are driven inwards. When the fracture has been the result of indirect violence, the broken ends are usually driven outwards, and the fracture if single is generally at the point of greatest convexity. This when fractured by indirect violence are often broken in two places, one in front and the other behind. Very often also when the violence is of the

nature of a force compressing the thorax, the fractures are symmetrical or nearly so, is inacture of a nb on one aide of the body is accompanied by fracture of the corresponding nb on the other side

Compression of the thorax, causing symmetrical indirect fractures of the ribs, may be due to accidental violence, eg 'lutific-reushing' on railways, the fall of a heavy weight on the front of the chest, or more rarely to a fall from a height. More frequently it is the result of homicidal violence, and may be due to pressure with the knees, tramping underfoot, or to compression of the body between two bamboos, a process known as 'bans-dola' Again, it may be due to kneading with the knees and elbows or 'kil kani' (see also injuries to the liver) Dr Harvey mentions a case in which symmetrical rib fractures were present, but no external marks of injury were to be seen on the chest, and suggests that in the case in question the compressing force was probably pressure with the knees

Non-penetrating injuries of the thorax may injure the lungs or heart in falls from a height, compression of chest by falls of heavy weights, wheels, buffers, or by blows If the lungs are injured, hemothorax or inflammation, either of them leading fatally, may follow, even when there is no fracture of the ribs. Emphysema may be present, but this is only dangerous to life from mechanical impediment to respiration. The phrein, nerve was ruptured with instant death in nine cases reported by Dr Coull Machenize (Ind. Mad. dag., 1889, p. 204).

Rupture of the heart is a comparatively rice result of non-penetrating cleest injuries Dr Harvey mentions fourteen cases in the three years 1870-72, five of them homicidal, and in several the heart was healthy, but in most there was fracture of rib or sterium and external signs of violence Dr Coull Mackenzie describes five cases of rupture of heart alone, one with rupture of spleen and one with rupture of other organs. The five former were caused by heavy weights falling and the other two by running over by laden carts. In four no external injury was visible, and in two no fractures of bones were present Dr Gibbons reports one case caused by blow of a thin stick with death in three hours and without fracture of bones. Rupture of the heart is diseased, from a comparatively slight amount of violence. Again, external violence may cases rupture of an even healthy heart, and yet no

<sup>1</sup> Ind Med Gaz , 1889

<sup>\*</sup> Ind Med. Gaz , 1897, p 443

external marks of injury be present. Hence, when the heart is found ruptured and no marks, or slight marks only, of external violence are present, it may be difficult to say what was the cause of the rupture. Non-penetrating chest injuries may cause rupture of a large thorace blood-vessel, eg. of the pulmonary artery, pulmonary veins, or superior veina cava, Rupture of the diaphragm also may occur (see below)

#### Abdomen Wounds.

Penetrating wounds unaccompanied by any internal injury are veen it accompanied by protrusion of viscera, not necessfarily fatal. Death when occurring rapidly is usually from shock, or after an interval from peritonitis Moreover, such wounds, and also wounds or rupture of the diaplingm, are liable to be followed by herma, and may hence (from strangulation) cause death indirectly, after a long interval. With a penetrating wound of the abdomen, there may be a wound of a viscular organ or large vessel leading to death from hemorrance; or a hollow viscus may be wounded and extravasation of its contents be followed by fatal peritonitis.

Fatal non-penetrating injuries of the abdomen may leave no external marks of violence. In some, but not all sacity cases, the tissues immediately underlying the skin at the seat of injury may on dissection be found to show signs of bruising and to contain extravasated blood. Blood, however, it must be recollected, may in rare cases be found extravasated in the muscles of the abdominal wall, without violence having been applied. Taylor' mentions two such cases, in both the extravasation was inside the muscles around the navel. A non-penetrating injury unaccompanied by any wound of the contents of the abdominal cavity may cause immediate death from shock. This is specially liable to occur from a blow over the region of the solar plevus, and in such a case, after deth, no marks of violence, external or internal, may be discoverable

Care.—Death from a blow on the abdomen.—Chevers quotes a case in which a man who was said to have been struck with at thick pole on the right loun died immediately. No trace of injury or of grave disease could be discovered on the most careful examination. "I therefore reported that, as blows influted upon the front of the abdomen had been known, in several instances, to cause death by a shock to the nervous system, it was probable that in this case like force applied to the side of the belly had acted in a sumlar manner."

Or an injury of this class may cause death from peritonitis, in which ease after death, no lesion other than signs of inflammation of the peritoneum may be found. More frequently the cause of death in fatal non-penetrating abdominal injuries is runture of a viscus such as the spleen or liver. Rupture of a viscus, however, it must be recollected, may occur from post moriem violence, especially when decomposition is far advanced. An idea of the relative frequency of occurrence in India of rupture from violence of the different abdominal viscera may be gathered from the following figures. Among the fatal medico legal cases reported in Bengal, etc, during the three years ending 1872 rupture of the spleen occurred in 564, liver in 129, bowels in 25, ktdney in 24, urinary bladder in 8, and of the stomach in four or five cases

Spleen.-Rupture of the spleen is of somewhat frequent occurrence in India, especially in the more fever-saturated districts where the spleen is often much enlarged by disease." and thus rendered hable to rupture from very slight violence Indeed, the enlarged spleen sometimes undergoes spontaneous rupture with fatal results without the application of any external violence The normal spleen of Indians as found by Prof Powell in 2000 autopsies on Indians (omitting cases of malaria, plague pneumonia and hæmorrhage) weighed a few grains under four onnees

Cases -(a) Spontaneous rupture of enlarged spleen -Ali Bux, a fine looking old Mohammedan, aged about 50 years, was engaged in a lawsuit in the Umballa court In cross questioning one of the witnesses, suddenly fell down and expired The friends, who brought the body to the Civil Hospital, were emphatic that he had not received any blow or knock of

Lt Col D G Crawford s analysis of 201 cases of ruptured spleen showed

that it occurred in 308 per cent of the fixed case sent by the police for medico legal examination—Inel Mid Gar, 1979 2 points out that rupture of the appears appears the police for the police of the appears have been at liable to occur in cases of (1) simple engoged epison, (2) hypertrophysical engoged spices, (3) small hard spices, (4) large hard spicen with the police of the The normal form and size of spien according to Gray, are as follows. The spleen has two surfaces one external and convex the other internal and concave two ends the upper thick and rounded, the lower thin and pointed, concave two ends use apper thick and rounted, the lower this and pointed, and two margins, anterior and posterior, the former often being notched Gray gives the normal size and weight of the adult (European) sphere as follows length about 5 inches, breadth, 3-4 inches, thickness, 1-14 inch, weight about 7 or In matives of this country, whose size and weight is usually much less than those of Europeans, the weight and dimensions of the spleen should presumably be somewhat less than the above. But in many parts of Bengai normal spleens are less common then are collected, and the average size and weight of the spleens in the adult native of Bengai would probably be greater than those quoted above The pathological cause of the enlargement is infection with either malaria or the 'Leishman Donovan parasite?

any kind, and an inspection of the court where he became faint, convinced me that there was no furniture or projecting angles where he could accedentally have knocked aguinst semething to cause internal injuries. Autopsy—Oa opening the abdomen on 11th October, I found the peritoneal exity full of a blood stanted fluid. There were also fresh blood clots. The amount of the fluid could not be measured, but probyhly there were several pints. The spleen weighed 3 lbs 13 czs, and measured by inches by 61 and was 33 inches thick. On its inner surface, anterior to and parallel with the bilus, was a rent in the capsule, 6 inches in leight. The opening was plugged with fresh black blood clot. The substance of the spleen was soft and frable. There were no other impures or signs of disease—C 11 James, Ind Med Gar, 1902, p. 222

(b) On 5th March 1878 a beggar woman Kamini, 30 years of age, who had been suffiring from chargement of the spleen for several years, at 3 30 o clock in the morning complained of source pain in her abdomen in the region of the spleen. No remadies were applied or given to her internally, and very shortly after she expired. At the autopsy on the same formoon The body was much emacanted the abdomen

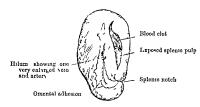


Fig. 12 -Showing Rent in the Spleen Capsule half filled up with Blood clot

was somewhat enlarged but there were no external marks of volence on it. The abdominal walls were not bruised. The liver was large, fatty and anemic. The kidneys were fatty and anemic. The other organs except spicen were healthy. The spicen was 12 inches long, 7 inches broad, and weighed 8 lbs 1 to 25. Its substance was very hard, and there were two ruptures each an inch long on the inner surface and lower end. There were several punts of serum in the abdominal cavity. There was 10 or 5 of dark blood of the colour and consistence of blood to the colour and consistence of blood to the colour and consistence of blood to the colour and consistence of the colour and c

Uncle vermant pelly m and around the sphere. No bones were fractored, (c) A natue male of about 25, suffering from malarious faver and enlargement of spleca, on the evening of the 20th December, 1878, applied for medical relief at the dispensary of the Mayo Hospital After receiving medicale relief at the dispensary of the Mayo Hospital After receiving medicale he has deed away slowly, with the assistance of a thick stuck, along the bank of the river Hospital for a distance of about half a mile to a landing place, on reaching this spot he said down, and half a mile to a landing place, on reaching this spot he said down, and a about fail at our T. Evanment the body about 12 bours after death when I found it to be well nourished and to have no external marks of volence on it. The lungs were healthy, and there were extensive recent

pleutite althesions of the exter surface of the left lung to the inner surface of the thoru. The spleon was about 12 inches long 8 inches broul at its lower and 8 inches at its upper end. It was hard. There were two ruptures on its inner surface and through its biles, each 2 inches long. All the other internal organs were healthy and were antime. There was a large quantity of airt fluid blood extra-assable into the abdominal cauty. I gave it as my opinion that the deceased died from spontaneous rupture of splees.—Mackenzer, Irid. Med. Gar., 1880, p. 322—Two further cases are published in the Ind. Med. Gar.,

This hability of the enlarged spleen to be so easily ruptured is taken into account judicially in awarding punishment to cases where a blow, kick, etc, has caused death in this way. For so slight often is the force required to rupture a diseased spleen that in many cases where this occurs from violence inflicted by another there is no intention of causing death!

In a few cases (8 out of 263) the ruptured spleen was not enlarged

Cause of Rupture—The rupture may be caused by accidental violence eq a fall, or from the sufferer having been run over by a wheeled vebuck. In non accidental cases it is often the result of a blow or a bick or a push against a wall or other hird body, without a weapon.

In 102 of the 217 cases of Dr Crawford the cause was besting with a 1 thin or other heavy blunt instrument. Bloss with fist, kicks or slaps or two or more of these combined accounted for 62 or over one fifth Talls from trees an 1m one case from a brulge gave 23 cases, 17 were run over by carts and 23 were said to have be on murdgerd.

A trivial blow may cause fatal rupture

Gase—Repture of spleen by slight blow—habit Sheikh, Musalman male 40 of Diwanganj 144th November, 1856 said to knew been likeld by a stab. A small wound { meh long gaping { inch wide oree eighth left rib about free unders aboo and external to the unshines. From its outer end a slight seratch runs upwards and outwards for three mehes. This wound was quies superficial, { inch deep pentiating only into and not through the subentaneous cellular tissue. Feritaneum healthy, contained about half a pint of dark find blood round spleen bloomand beautions and the stable of the spleen shounded the stable of the spleen shounded the spleen probably caused by the blow, triling in itself, which inflicted the wound over eights tro—Dr. D Crawford Ald Mid-Mar, 1980, p. 205.

Oase —Rupture of Spleen by Artificial Respiration.—Professor Fowell reports an autopsy in a case where the spleen was reptured by a medical man in performing artificial resolution for onium poisoning

It may occur without any external marks of violence being present—this was so in about one third of Harvey's cases—but

in about one-fifth of these the tissues under the skin over the region of the spleen, on dissection, showed signs of bruising Rupture, even of an apparently healthy spleen, may be unaccompanied by external marks of violence, but in such cases the subcutaneous tissues will probably (but not certainly) show signs of bruising

Site of the rupture-thus is generally on the inner surface.

Period of survival after rupture. - Death may occur in a few minutes or not for several days. Chevers mentions one case of survival for five days and another of death on the eighteenth day from pleurisy and pericarditis. Considerable power of locomotion may remain after receipt of the injury. Dr L G Russell, 1 M S gives two 1 cases in which recovery apparently took place after rupture or bruise of the spleen, the diagnosis, in one case, being confirmed by dissection of the victim, who died several years afterwards. He also quotes four cases in which the victim survived the injury for over twentyfour hours, in one case five, in two four, and in one two and a half days Dr Powell relates a case of a European lady, aged 60, who was knocked down by a cart, drove to hospital in a springless cart and lived eight days. Her spleen was found ruptured at the post mortem

Cases — (a) Dakka Hindu male, 31, said to have been beaten on 2nd January, 1888, and to have died 'a few days later' Post mortem on 7th January, 1888 I erstoneum contained a pint of fluid effused blood,

large omentum brused small gut brused in many places, stomach empty, spleen much enlarged, ruptured at upper part of external surface (b) Mymensingh, Musalman male ten, said to have died three days after being knocked down No external marks or injury Peritoneum healthy, stomach healthy, contained a little muddy fluid, spleen slightly

enlarged, a small rupture 1 inch long at lower end of anterior border, 3 in-3 in of blood effused around the rupture (c) 24 Parganas, Musalman male, filteen, said to have been beaten with lattize on 20th July, 1897, was admitted to the Campbell Hospital on the same day, and died there on the 6th of August, post morten on 7th August There was an oblique longitudinal mark, five niches long, across the left side of the back, with fracture of four ribs the eighth to deventin left rive "The 'dit 'ampand and paradel 'annes, and 'ine 'dit wing of the sphenoid bone, were fractured, liver pale, waxy, bloodless, spleen much enlarged, weight 1 lb, a rupture, I meh long, on mner aspect, left kidney weighed 6 ozs, a rupture in it, I meh long There can be no doubt about the facts of this case, as the boy was in hospital from the day of the mury till his death. He had undergone fracture of three of the bones of the skull, four ribs and rupture of two viscera. Yet he survived for no less than seventeen days, and, in the end, the immediate cause of his death appears to have been inflammation of the meninges of the brain -I. M G , 1902, p 219

\* Malarra, its causes and effect 1880, pp 217,0214 MEDICAL

Wounds of the spleen are rarer than rupture—In Dr Criwfords series there was only one case to every fifty of rupture Death has in soveral cases resulted through hamorrhage from exploration of the spleen with a hypoderimic needle in cases susceeded to be malarie or Kala Agr.

(c) Dakke 2nd January, 1872. Musalman male, age not noted, sant to have been killed with a needle Marks of punction in left hypochondrium Abduled with a needle Marks of punction in left hypochondrium and punction of the property of the pr

selection as the organ was soft and vascular (b) Dakka 14th November, 1890 Hindu female, 45, said to have died of wounds A wound between scapula six unches long one broad, one deep A second wound between tenth and eleventh ribs on left side, six inches long 14 broad penetrating abdominal cavity. Purtoneum contained 4 or 5 coscula s domes brottended through a cound contained

half digested rice and dil Spleen escaped through wound, completely divided in two parts transversely

Liver —Rupture of the liver is usually the result of extreme violence accidentally applied, such as buffer accidents, or when body is run over by a medior (ast Thire is reason to suppose that "in very exceptional cases recovery may trike place after a slight rupture of this viscue, and also that in very exceptional cases rupture of the liver may occur during life, without application of external violence Non-accidental rupture of the liver may be caused without a weapon Harvey, for example, mentions a case where it was ruptured by a lack, and two others in which the rupture was caused by kneading with the knees and elbows, or 'lil land.

Rupture of the liver may occur from violence inflicted during life, without any external marks of injury being left. In about one fifth of the Bengal cases no external marks of injury were present. Considerable power of locomotion may runnius after recept of the injury. Taylor remarks, that unless the large veins at the back of the liver are injured, bleeding from a ruptured liver may occur only slowly, and the patient surrive some time, but thereafter the rapidly from sudden copious effusion of blood, caused by muscular exertion, or first violence. The same author mentions one case of survival for eight days, and two of survival for ten days, after rupture of the liver.

In 33 cases Dr. Coull Machenzie found the cause to be -14 cases by being knocked down by runaway livries in or outside carriages and by

bullock carts, 8 resulted from fulls into the holds of ships and boats, 2 resulted from falls on piles of bricks, 1 was a man knocked down while helping to remove a boiler—the boiler rolled on his back and crushed him to death, 1 was that of a man struck by a tub full of salt, which was being removed from a ships hold 1 a porter who while carrying a heavy box on his head, shipped and fell on his back with the box on the front of his chest and abdomen, 1 was a man who, while working on board a ship, was struck by a shing containing three 2 maind bags of  $d\bar{d}b$ , 1, a drunken man fell heavily on a hard metal rod, 1, a saw stacked over the abdoment by a horse he was grooming, 1 a lad in a fish ing boat which collided with a pontoon of the Hughil Bridge was precipitated into the rirer and rither was driven by the current against the pontoon, or its mooring chains a few yards below, 1 was a man struck by the haulde of a winch, in motion

Death was reported to have occurred matantaneously in 11, or 22.3 per cent, within an hour in 4 or 117 per cent in from one to whouse, in 1, or 29 per cent from two to three hours, in 4 or 117 per cent, in three to seven hours in 1, or 29 per cent, in three days, and in 7, or 20.5 per cent the time was not mentioned by the police authorities.

Case — Motor car Rupture of Liver — Prof Powell reports "A Pardesi, aged 22 ran against a motor car on the 20th July, 1915, the front axle passing over his abdomen. He died eight days later when I found rupture of the liver

"In 1902 a clerk was seen to walk about twenty parls and then he down on a bench in Colaba Railway Station. He shortly after died Post mortem I found the liver crushed into several pieces, one piece nearly as large, as a tetunis ball lying free in the abdomnal cavity. No doubt he was caught between the buffers of some trucks that were being shunded at the time.

"I did not credit the statements of several eye witnesses who said he had walked unaded to the bench but subscient experience of many cases of rupture of the liver in motor car and other accidents has now convinced me that the statements of the eye witnesses were quite credible."

Case.—Homeadal rupture of laver.—In 1880 a drunken native in an altereation pushed another buk Chand Karmokar, who fell heavily to the ground and died very shortly after Post mortem evamination showed no marks of nigric on addomen or thorax but a rent in right lobe of liver five inches long liver was hard and not enlarged Prisoner was tried for culpable homicide not amounting to murder.—Dr Coull Mackenzie, Ind. Mcd. Gaz., 1880, p. 220.

The gall bladder may be ruptured by volence, as in a case mentioned by literove, in which the subject was a boy at five, who had been strangled and in which the rupture was probably caused by pressure with the knees Ogston, however, remarks that "ruptures of the gall bladder proper have usually been the result of emetics given to ensure the expulsion of gall stones"

Intestines —Rupture of the intestines is usually fatal, the cause of death being commonly peritoritis, the result of extra vasation of their contents. Rupture may occur solely from

disease, or from violence acting on a diseased portion of the intestine, or solely from violence. Hence, when this injury is found, cireful examination of the ruptured portion for signs of disease, eg ulceration or softening, is of special importance.

The position of the rupture was the upper jejunum in four cases, the lower in two, the middle in one, the ileum and the sigmoid flexure in one, in Dr. Machenzie a cases

Rupture even of a healthy portion of the intestines may occur from a comparatively slight amount of violence. The violence canning the rupture may leave no external marks. Out of tweaty five Bengal cases in twelve external marks were absent, but in five of these, on dissection, signs of bruising were found in the subcutaneous tissues. Rupture of the intestines may be the result of accidental or non-accidental violence, sevin of Harvey's cases apparently were accidental. Ton out of Mackenzies eleven were accidental, the follows, or crushing. When non accidental, the injury is often the result of a blow without a weapon. Usually, after the receipt of the injury, the sufferer is capable of considerable muscular exertion. I or injuries to the Rectum, see p. 139.

In Dr Mackenzie's fatal cases 1 died in 7 hours, 1 in 12 hours, 2 in 24, 1 in 29, 2 in 30 1 in 58 hours, 1 in 3 days, and 1 each in 5 and 8 days. The cause of death was pentonitis in 9 out of the 11 cases, and shock in the 2 others

Case—Rupture of intestins—In 1883 Newal Esson Chaube, in a discuss, in which the Chinames rapidin in Calcutta about the price of shoes, no which the Chinames truck Newal with a bomboe, and another Chinamest lacked hum in the abdomen. The injured main reclaims after the chinamest lacked hum in the abdomen. The injured main reclaims after the season of the chinamest lacked human the short the reclaim to the chinamest lacked human the same that the same the chinamest lacked human the process in the lower third of the jepinum, around which lymph was extra vasated. The abdomen contained T2 ounces of facal smelling brown fluid, and there was cette peritoniats. Death was reported due to per tomitas following rupture of intestine. The two Chinamen were tried on two counts—culpable bommode not amounting to murder, and doing a rash and negligent act, but were sequitted by the jury on both charges—Dr O MacKenne, Ind Med Gar, 1500, p. 190.

rotate—Gunshot blow of intestine without wound.—Dr A Powell reports a case of an offeer struck at Sannas #Post in 1900, on the anterior abdominal wall by what he thought was a Manuer build: There was only slight bruising and abtasion of skim. A few days later obstruction set in. Addomination beautiful structure of the structure

Stomach —This viscus is liable to rupture from disease Cases also are recorded of rupture from over distention and violent ineffectual efforts to vomit, and of spontaneous rupture without any very apparent cause. Taylor mentions a case in which rupture both of the stomach and the

spleen occurred from a fall of about twenty feet, and in which no bruises or other external aigns of inpury were present. In one of Hartey's cases, also, although there was a fracture of the skull, and bruises on various parts of the body, the result of *lath* blows, no external sign of injury could be found over the region of the stomach, although this viscus was ruptured. It is possible, therefore, that rupture of the stomach from accidental or non accidental violence may occur, and no external signs of injury be present.

Pancress—Injury to this viscous from external violence is very rare.

McLood and Harvey, however, each mentions a case, in the first the

viscous was ruptured, but no external marks of injury were present,
in the second the viscous was "injured," and contusions, not visible

externally, were prisent on both sides of the spine. In both, the injury

appears to have been caused by kicks or trampling with the feet.

Kidneys.—Rupture of the kidney solely from disease is extremely rare. Disease or abnormal formation of this viseus may, however, conduce to rupture from violence. Rupture of the kidney usually occurs only from great violence, and hence is often accompanied by other lessons. Not withstanding this, in nearly one half of the cases, signs of external violence over the region of the kidneys were absent. In suxteen of Harvey's cases, the nature of the violence causing the rupture was stated. This was in eight, blows from blant weapons, in two, kicks, in one, that was not the resulted from falls from a height. Two cardends of the resulted from falls from a height. Two cardends One, a man, lived 38 hours and dud of shock, the other, a gril, died within half an hour, of hamorrhage. Taylor mentions a case in which aman walked some distance after an accident whereby one kidneys was torn completely across, death occurring suddenly, within six hours after receipt of the inpury

Bladder.—In rare cases, rupture of the bladder occurs solely from dasease, ether of the bladder tried for disease, e, g paralyss or structure, leading to over distention. In the great majority of cases, however, the cause of the rupture is volcine applied directly to the region of the distended organ. Often in cases of rupture from violence, no external marks of linury are to be found. The injury is usually fatal, either from slock, or peritonitis due to extravasation of urine, recovery, however, sometimes takes place. The violence leading to the rupture may be accidental, eg a fall from a height, or a fall on some projecting object, or a crush, or non accidental, eg a fack in the pube region. In females, rupture of the bladder sometimes occurs from pressure of the child's head on the urethra, causing over distention during delivery.

Uterus —Rupture of the unmmyregnated uterus is only likely to occur from very great violence. Rupture of the pregnant uterus may occur independently of violence, as an accident during feltuery, and, in mre cases, may be partial only, affecting the peritoneal cost and muscular itsue, but not extending into the cavity. Tkupture of the pregnant uterus may occur from external violence without any external narks of injury being present. The uterus often apparently escapes unjury, even inhering read violence is applied to the abdominal wall in attempts to cause miscarrage (see cases 'Abortion') Harvey, however, mentions a cave in which extensive bruising—not rupture—of the uterus, caused in this way, resulted in death; in this case also, no external marks of violence were present. The uterus may be wounded per vaginam, in an attempt to cause miscarrage. Injury to the uterus per vaginam also sometimes

risults from thrusting sticks, etc., into the vagine after rape, or in revenge for infidelity. Rupture of an ovary, or fallopian tube, may be found this it must be remembered, may occur as a result of ovarian or tubal pregnancy, and hence blood-clots, etc., found in the abdominal cavits should in such classe be carefully exempled for a embryo

Large abdominal blood resists—Harrey mentions three cases of rupture of the inferior vona cava from extreme violence. In one—caused by the sufficer being jammed between two bosts—braising of the mesentery was the only other serious injury present. In another—the result of a fait from a high tree—the shall was also fractured, and in the third the liver was ruptured. The same author also mentions a case of probable, rupture of the splene vein.

External genitals.—(a) The male genitals.—Severe contusions may cause death or severe compression of the testicles may prove fatal from shock

Seizing by the testicles is a common method of assault in India, and Chevers mentions a case in which a man dragged another along in this way with such violence ' that the whole preputial integument was torn Incised wounds may be attended with severe and even fatal h emorrhage or by extra asation of urine ultimately terminating fatally Incised wounds amoutation of the penis, even removing the whole of the external genitals are sometimes self inflicted, generally, however, in such cases the individual is instine but individuals apparently per fectly same may mutilate themselves by cutting off a portion of the penis. In India removal of the male central organs used formerly to be largely practised in order to manufacture ennuchs for immoral purposes. Young boys were generally selected, and a clean sweep made of the whole of the organs Chevers, on the authority of Dr Llien, appears to consider that, in 1870 this practice still existed extensively in the Rajputana States and Harrey (1871-72) mentions the case of ' a Chamar boy, aged eight at Banisal whose genitals were completely out away, probably to fit him for the duties of a cunuch Cases of this kind excluded, incised wounds of the male genitals inflicted by another indicate as a rule a sexual motive Occasionally the person inflicting the injury is a female, as in a case cited by Harvey of a woman at hachar, who seized a weapon and inflicted a deep and severs wound on the perus of her father in law, who wished to take liberties with her. He also mentions an exceptional case, in which a curuch possessed of a penis had it shaved off by some of his fellow-eunuchs, apparently from motives of jealousy

Case —A 'playful kick on a boy's permeum is reported by Dr A Powell to have caused death by rupture of urethra with extravasation of urine

Case —Branding of Vulva.—Prof Powell reports having seen three cases of branding of vulva with a red hot dhao or kuife, as punishment for suspected infidelity, and one case as a prophylactic on the Crusader's principle of the iron drawers

(b) The f-male genutate —Insused, or even contused wounds of these may prove total term loss of blood. Some years ago, several cases occurred in Scotland of number by wounding the female genitals. In one of these, detail occurred in ten munites, and in another, a wound of the labum three-quarters of an inch long and three inches deep proved rapidly fitted from less of blood. A kick on the vulta—blae above on the

head-may cause an apparently incised wound, and prove fatal from hamorrhage (see Case below)

Tatal hemorrhoge may, however, occur without external violence, from spontaneous rupture of a large ven in one of the labia, as in a case referred to by Ogston! Wounds of the female genitals are some times the result of an accidental fall on some projecting sharp or pointed object. In India, cases of injury by thrusting a stack into the vagona are not uncommon. Harvey stats that twenty five such cases, ten of them fatal, were included in the Beogal etc, returns for 1870-72. Some times such injuries are sometimes produced in attempts to procure abortion.

Case — Death from a keck on the vulva — A woman, at thirty six, while in a stooping po-ture, was kecked by her husband in the lower part of the abdomen and deed in about an hour from loss of blood. There was no injury to the vagina or uterus. There was a wound about 1 inch long and ½ inch deep stuated at the edge of the vulva extending from the pubes along the ramus. The left crue chtoralis was crushed throughout its length and from this the fatal humorrhage had taken place—Taglor, Vled Jur. 1 678

Rectum -Thru-ting a stick or other similar object into the anus is a mode of torture or murder occasionally resorted to in India, and the threat to do this is a very common form of abuse Injuries produced in this way may cause death. Lifteen cases-eleven of them fatal-of the infliction of this form of violence were included in the three vears returns for Bengal, etc., reported on by Harvey Very often other injuries accompany this form of violence. An individual, for example, is attacked and violently beaten by several others, and finally thrown down and subjected to it. In the majority of such assaults, the victim is a male and the motive leading to the infliction of the injuries appears to be most commonly punishment for adultery or theft Possibly, also, in some cases, the injury is connected with sodomy, in the same way as similar injuries to the vagina are sometimes connected with rape Chevers mentions a case, in which several children, of about eight or nine years old, threw down a boy, one of their number, and killed him by thrusting a small stick into his rectum, and Harvey mentions a similar case, said to have been accidental. But it is to be remembered that dilatation of the rectum and protrusion of the gut, is a common effect of putrefaction, and hence that such a condition does not necessarily indicate the infliction of this form of injury Injuries to the rectum and anus are sometimes the result of an act of sodomy (see ' Sodomy')

Extremites—injuries to the extremites rary greatly in grantly, according to their situation and extent Death may result it a large vessel is wounded directly from loss of blood or, if the injury is severe, from shock, and slight injuries may contribute to the production of fatal shock in cases where this results from numerous slight injuries. Again, migrate to the extremities may prove indirectly fatal from inflammation and exhaustion, or from supervention of disease, or, if the large vessels or nerves are divided, may necessitate amputation, followed by similar consequences. Injuries to the extremities necessitating amputation, or permanently impairing their power, of course amount to greeous hurt. Objustly, injuries to the extremities may be accidental, or self inflicted. No further remarks are called for here in regard to

these As regards injuries inflicted by another, it may be pointed out that very severe injuries of the extremative may be produced without a wagnon. Violent fowaring of a limb for example may cause dislocation of a joint. Again comparatively slight injuries to the extremities especially when caused by ropes or cords, may indicate the infliction of very severe torture. The instance of the forture thus indicated may be torture by compareson as when the fingestim are less together and weight of the contrained position for the forture the product of the forture that the constanced position or torture by majecution. A recognized torture by pelice to extract confessions into thrust thorns into the quicke of the finger nails and toe nails. Harvey mentions a case which shows that suspension held downwards may cause leath from congestion of the brain. Cases in which the right hand is completely severed from the body are tolerably often met with in India. This especially if accompanied by mutualting wounds of the care or nose usually indicates punishment for adultery or for their as the motive leading to the millettion of the ingre-

In the cases of torture by Bans-dola (see also p 128) or crushing by bumboos being foroibly rolled over the chest there may be if the body is fresh no external marks of injury, yet the ribs may be broken and the lunes lacented

#### CHAPTER V

# HOMICIDAL WOUNDS v. SUICIDAL OR SELF-INFLICTED.

"For murder though at hath no tongue, will speak "

Is the wound 'accidental 'self-inflicted, including 'suicidal,' or inflicted by another 'homicidal'? The importunce of this question is obvious. In considering it we must remember that in India severe, even mortal, injuries are sometimes inflicted on an individual with his consent by unother or others, for the purpose of supporting a false charge

Cate — Wounds inflicted by consent in support of falso charges. Chevers (Med Jur p 1883) states on the authority of VI Perceval that at one time two or three gangs existed in Bombay who cut and wounded each other for the purposes of extortion. They used to cut one another's necks and arms by turns as the lot fell, and accuse some rich passer by of having done it. It fell to the lot of a youthful member of one of these gangs to have his neck cut. The person appointed to cut mis was a duralen barber, who, instead to making a slight cut, inflicted a mortal wound. The gang field abandoning the youth, whose dying confession led to their arriest.

Cate —In a case before the High Court, Bombay (the Almedia bad Consprincy Case) the evidence showed that certain individuals, AB and others wishing to injure CD and others, proceeded as follows — They hired two men to would a third, E instructing II, after receiving the injury, to first of all accuse them (AB and others) of the assault, and then to make a pretended confession that this was a false charge brought at the instigation of CD and others. This programme was carried out, E very nearly dying owing to the severity of the wounds inflicted on him, and CD and others were convicted of instigating E to bring a false charge against AB and others. After CD and others had suffered a considerable portion of their sentence of imprisonment had return the sufference of the control of the sentence of interest and the truth was discovered A and B having brought a civil action for damages for malicious prosecution against CD and others, who were constituted by an individual who had kept himself in the background, but was the real mover in the whole plot. A and B, having succeeded in convicting C and D, had caused an attorney's letter to be written to this individual demanding payment of the promised reward! And it was principally by proof of this fact that the real truth came out

Case -Murder to support a false charge.-Reg v Muhammal Amanji an I Hus in Amanji (Bo H. C Rep., Vol VIII. 1871, p 110) -A summary of the main facts in this case and two others connected with it (Reg v Muhammad Valle and Reg v Alibhas Witha) is as follows —It appeared that two factions existed in the village of Karmar in the Broach Collectorate—A and B. Alibhai Mitha and Muhammad Amanu were members of faction A and Muhammad Valli was a member of faction B The two factions had a scuille, in which one of the members of faction B got a blow on the head, and was taken into Broach On this, faction \ held a consultation at which it was determined to I reak or bruise the head of one of their own party (Alibhai Mitha s old mother) and take her into Broach as a sort of makeweight against the broken head on the side of faction B. This was done apparently with the consent of the sufferer, and a false charge laid against faction B. While Alabhara mother was in hospital. Alabhara faction (faction A) held another consultation the result of which was that they determined to poison Alibhai's mother in order to have a death on their side instead of simply a broken head. Accordingly they put arsenic into some food gave it to the old woman who thereupon was attacked by violent vomiting which it was stated brought on rupture of the spleen from which she died. On this Yuhammad Valli (a member of faction B) brought his sister out of his father a house and killed her by striking her on the heal with an axe She was heard just before she was struck to say Why do you kill me for other people? Muhammad Valli then dashed his own head violently against a wall—all this appears to have taken place in presence of the girl's father and other witnessesand a false charge of murder and assault was then laid against faction A Next Muhammad Amany, a member of faction A expressed his intention of killing himself as a set of against the girl's death. On this his old mother begge I that she might he killed instead Thereupon Muhammad Amanii and his mother went into the backvard of their house, and shortly afterwards the former rushed out with a wound on his chest, calling for the police patel to come and take the deposition of his wounded This was done, and the mother taken into Broach to the hospital There her wounds were considered slight, and fifteen days after her admission she was discharged, and went back to her village About six days afterwards her corpse was brought back to hospital The civil surgeon certified that these wounds did not bring about the death of this woman she died of old age. This however the court appeared to doubt In giving judgment Gibbs J, remarked "The evidence that there are two factions in this village, and that murders ehows. have been committed on each side not as would be naturally expected, by members of one faction on a member of the other, but by members of one faction on a helpless female of their own so as to throw either the guilt of blood or the blame of the crime on the other party Such a state of things is hardly credible but this is an instance of fruth being stranger than betien

#### Homicide.

Homicide, or the murder of a human being is the most serious of all erimes and it is punished as such under British law in India, where life tends to be held rather cheaply

Causes of homicide in India -The causes which lead a man in India to commit murder are often trivial in themselves They usually originate in quarrels about land and women, or in robbery and malice

- 1 Connected with sexual relations—Under thus head may be noticed as more or less common in India (a) Murder of husband by the vote here the motive is usually either revenge for ill treatment or the facilitation of an intrigue, and very frequently poison—often in the latter class of cases supplied by the partmour—is the means resorted to, though in some cases the poison is given as an aphrodisma or love—philter, and not with homeidal intent (b) Murder by way of punishment for adultery here mutilation of the body of the victim often accompanies the murder mutilation of the nose-vers, lips, etc. is a not uncommon method of punishing a woman for sexual inflicity. (c) Murder of women pregnant from illuct intercourse in such cases the victim is frequently a Hindu widow (a victim of the custom which prevents the remarriage of child widows) and very often the fital result is a consequence of injuries inflicted for the purpose of procuring criminal abortion (q 1)—(d) Infanticide (q v), also frequently the results of the Hindu restriction on child widows (e) Murder of femalis after violation or rape (q v)—the victim being in some instances a young girl, in others an adult female. Young children (omitting Hun cases in war) are reped first, and murdered afterwards to destroy evidence. Adults are first murdered to overcome resistence and then raped, as a rule.
  - 2 Connected with acquisition of property —More or less common examples of this are (a) Homicide arising out of disputes in regard to the possession of land. Often such disputes lead to affrays in which clubs and other blunt weapons are freely used with fatal risults (b) Death from injuries inflicted by a gang of robbers or davoits the injury being sometimes inflicted by way of torture, often by burning, in order to extort information as to the place in which money or valuables have been hidden (c) Murder of young children for the sake of the ornaments worm by them. This is a variety of homicide of tolerably frequent occurrence in India (d) 'Thuggi' or lighway robbery accompanied by homicide.

    The description of murder used formerly to be often met with in India, stringulation being the means commonly employed. Thuggi, however,

Where five or more persons conjointly commit or attempt to commit a robbery, or where the whole number of persons conjointly committing or attempting to commit a robbery, and persons present and adding such commission or attempt amount to five or more every person so committing attempting, or adding, is said to commit descript. "—I P C, 3 891

is now rare and in such cases as now occur the death of the victim is usually the result of drugging datura being the agent commonly used (e) funder by way of p mishment for theft is not infrequently met with in India in which thieves caught in the act are set upon and violently beaten perhaps killed

- 3 Sacrificial —Human sacrifice as a religious rite several cases of which are mentioned by Chevers formerly widely prevailed in India but has now been largely suppressed though it has been on the increase in India in the past few years (1917). The same may be said of the practice of 'satt or widow burning before alluded to and of the practice of burying vidows alive in their husbrids graces formerly prevalent among certain castes. Cases of homicide connected with superstition still however occasionally occur in India eg the Lilling of individuals suspected of witcheraft and cases in which death results from the subjection of the victum to an or leaf for the discovery of theft (see case p 31) or of supposed practice of witcheraft (see Drowning Chap VII). A case of a father securious his son occurred in Bombry in 1901 and another in 11910.
- 4 Murder of infants—The peculiar features and modes of detecting this crime in India are described under Infanticide Chap \(\frac{\text{VI}}{\text{II}}\)

The Victims of criminal i omicide are often unoffinding persons. Murder cases often occur in India in which the victims are unincrous and include children or others who have given the murderer no offence. In cases of arenical poisoning for example the victims are often everval in number some being children and often in such cases it enjury to average which the murler is committed is of a very trilling character Agun in running amol. cases it frequently happens that some or all of the victims are unoffending persons. Cases also are sometimes met with in India in which as individual in order to revenge him elf on an enemy kills some unoffending person sometimes a relation or friend solely for the purpose of bringing a false charge of murder against the person who has injured him.

Homicide with consent of victim In India it sometimes happens in a case of homicide that the individual killed has consented to suffer death. Thus for example in the cases of homicide for accuration just referrel to the victim is sometimes

a consenting party to the crime The custom of the burying alive—'samadh'—of lepers, which formerly was widely prevalent in India, affords another example of this description of homicide, as, at any rate in the great majority of cases, the sufferer used to be a consenting party.

#### Suicide.

Suicide, or 'self-inurder' is regarded by the law as murder, a murder committed by a man on himself, and the distinctions between murder and manslaughter apply also to this So fully is suicide held to be murder, that every one who aids or abets, suicide is guilty of murder. It is in law the same as felo de se or felony committed on one s self. The expression usually added to the verdict of suicide, namely, 'whilst temporarily insane,' is a legal contradiction, for an insure is held to be incapable of murder, or indeed any criminal act, either upon himself or another.<sup>2</sup> This expression is regarded as a charituble addition' to relieve the suicide and his family from the stigms and other penalties of the crime, and for recovering the monies of life assurance.

Curiously enough, although suicide is self murder, yet an 'attempt to commit' suicide is not an attempt to commit murder, but a common misdemeanour (Regina v. Doddy, 6 Cov. C C 463)

## Causation of Suicide and Suicidal Mania.

It is generally considered that every person who commits of attempts to commit suicide must be insue, at least, momentarily, when they have reached that complexity of mind in attempting to slay himself or horself, but by far the great majority of suicides occur in those who hall themselves without having shown signs of insunity, or such marked signs as would have warranted their restraint by law Suicidal propensities occur in all forms of insunity, in manaect melantchic, and also monomanical, but although the onset of suicidal tendencies is readily noticed in insue patients of asylums and precutions are taken accordingly, in civil life these premonitory signs usually pass more or less unnoticed.

What are the incentives to suicide?—The most practical answer to this question that we know of is given by Dr Wynn

<sup>&</sup>lt;sup>1</sup> Sir Jas F Stephon Hist of Crim Lau 1883 HI 104 <sup>2</sup> R H Wellington Trans Mel Leg Soc , 1903, I , 82

Westcott, and although his experience lay in London it never theless helps us to understand the inner causes of Indian suicide He says the conditions of life which make life unbearable to the suicide are very various seldom single, and often complex. The sufferers from misfortune, passions, dis ' appointments fear and pain, although not insane in a legal senve, do essentially differ from those neighbours who do consent to live from day to day under mental or bodily sufficing until released by the return of peace and happiness or by a natural death. It is not possible to define the difference between these two types of person but the essential difference does exist and has been the subject of great controversy', some believing it to be the difference between the pessimist' and the optimist the true believer and the unbeliever the coward and the brave man. 'Some doctors say, continues Dr Westcott ' that the distinction is based on heredity, or, at any rate that an instability of character is founded on an imperfect or faulty material basis in the brain and nervous nor can the characteristic tendencies of the defective state be recognized by symptoms unless the blot upon the brain be so deep as insanity

The proximate causes of sucide in Dr Westcott's long practical study of the subject in London appear to be seldom solitary. In the majority of cass we have found that the sufferer has tolerated much discomfort pain or sin for a long period and then has succumbed to an added greatence, or to the onset of an overmastering passion. So that we are able to refer to the basic absence of sufficient visuals or the determination to survive and in addition to a secondary cause, such as a fit of passion an attick of pain, or a disappointment in love. In ordinary cases of suicide it is not practicable to obtain sufficient details of life-bustory to decide on secondary and final causes with accuracy, only approximately.

D rect causes of sunside.—In England according to Dr Westcott, next to alcoholic errors (with 1st loss of occupation money troubles family quarrels and debuschery) the most fertile cause of suncide 1s detour. The voltent pan of soute disease and the prelonged sufferings of chrome diseases that lead to the number is grave, necessable these even more commonly found to level to suncide than such as are very pain ful. My statistics show that ten per cent of succedes are due to illness vir. paralysis milinenza cancer un,thral structure prostate pless locomotor stary, neuralges and the augma of cardiac disease incomma is a common cause. Hard work and overstarm worry of busness, loss of reputation

On Stucide Trans Med Log Soc , II pp 87, etc

family and unfortunate love affairs and every thing that lessens human prosperity affects the mind projudently and encourages self destruction. In Irance out of 5022 suicides, "twee alleged to be due to mental disorder, by to domestic troubles, by to alcoholium \$t\$ to proverty and missery, I to prin and remores \$J\_t\$ to unrestrained passions, \$J\_0\$ to remorae and fear of retribution, and \$J\_0\$ were unclassed

Causes in India of suicide.—Like the Romans, the Indians approve of suicide under certain conditions—the Greeks did not, and it is curious that the Greek view should agree with the Christian prictice in abhorring suicide

Pythagoras and Socrates took the sentry view of life—the sentry duty might be bitter and laborious but man has been placed on guard by one of his superior officers—the gods and was guilty of desertion if he voluntarily quitted his post On the other hand, the Roman Epicureans held that if life became no longer enjoyable death was the wiser alter native The Stoics based their approval of suicide on severer and nobler How argued they, could a man live according to right reason if his body was distempered by disease, his reason decayed or doting his better will coerced by a political tyranny perhaps crushed by cruel tortures? To these evils the 'ushering of oneself out of life' Whilst the early Christian view was that was a welcome deliverance pain and sorrow are disciplinary benefits, instead of evils and that self destruction since the Council of Arles in 452 a D was branded as impious and a felony, so that the body of the suicide was denied burial in con secrated ground, and his property was confiscated.

In modern times however, amongst civilized nations, there is a tendency to halt between these two extremes, in that whilst discouraging self destruction, practically no legal penalties are attached to suicide or attempted suicide in Europe or America "though abstiment of suicide is held to be equivalent to murder in England In India an attempt at suicide is an "offence".

For India the following causes of suicide deserve special mention, from their frequency, or peculiar character, and it should be noticed that most of these are also alleged causes of insanity

Domestic troubles and worries.—The mental distress arrange out of quarrels with their husbands, or husbands' relatives often of a trifling character, is a common cause of the suicide of wives in India, and similar domestic differences are also a not uncommon cause of the self-destruction of the husband

Remorse and shame.—This is not an infrequent cause of self murder amongst Hindu women as a result of illegitimate

<sup>1</sup> On Sucide, Trans Med Leg Soc II p 91 2 Analyzed by J F Kolb in his The Condition of the Natives Michael Ly Westcott vbd, p 88

relations consequent on the custom of enforced child widowhood (see cases in Chapa XII) and XIV), and it also operates in cases of unrestrained passion, jealousy, and indulgence in debauchery, and fear of arrest on criminal charges

Venereal Disease is a frequent cause of suicide. So much so is this, that Professor Powell states, "In otherwise inexpitable cases of suicide I instinctively examine the points, venereal disease being a common cause of suicide, sometimes from sphilophobia, more often in cases of persons engrged to be married, or in married men whose wives are expected back from home or the 'Hills after a prolonged absence."

Fanatic, religious, and imitative—Self destruction from religious motives was formerly of somewhat frequent occurrence in India. One variety of this form of suicide consisted in the individual offering himself as sacrifice, in order to proputate one of the Hindu deities, as, for example, by casting himself under the wheels of the car of Jagyrnath, or drowning himself in the Granges—No doubt also, in some cases of 'sati,' or burning of widows on the funeral pile of their histands, formerly of frequent occurrence in India, the victim was a consenting party willingly or unwillingly Several forms of religious suicide have been detailed on pp 30, 52

Suicide by children is not uncommon in India. Out of 1716 suicides in Bengal 23 were children, and out of 4172 in Oudh 46 were children. The means by which suicide is usually committed has diready been detailed.

The vertice' smoude while me a state of temporary mananty, so frequently returned by coroners' juries in England is most probably in many cases the result of the fact that by the law of England, self destruction (in a person of sound much is a felony (felo de sel) or mucker shalling forfesture of goods and burnal in unconsecrated ground unless the succeed be declared to be of monoid mind, and the average English my shrinks from calling the suicede a ceruminal. The law of India, however, contains no provision making the actual commission of sounded an offence or contains not provision making the actual commission of sounded an offence to the contains of the suice of the sui

Frequency.—In England, suicide, which forms about onetenth of the reported violent deaths, is over 100 per million of population, and is, as in all civilized countries, steadily increasing, the rate having progressively increased from 66 per million in 1501 to 105 in 1903. London itself has a rate of only about 90 per million living persons and has always had a smaller rate if an fore gn eities wijch have been estimated to have the following suiede rate per million living —Paris 400 Stockholm 3-0 Copenhagon °02 Vienna 290 Brussels 270 St Petersburg 204, Berlin 170 New 10x 150 i

In India the reported annual death rate from suicide according to Dr K McLood runges from about 50 to 80 per million of population except in Bengal and the Punjab which are reported much less

The sexual ratio differs remarkably in I nglish and Indian suicile statistics in that while in Ingland the suicide death rate among males is three times as high as among females (for the eight years 1887–1905 the proportion is almost exactly 3 to 1) in the different Indian proximees the female suicide rate exceeds the corresponding male rate. Thus in the Madras Presidency where the rates for the two sexes differ least the female suicide rate is about one-tenth higher than the male rate, while in the United Provinces where the rates differ most the female suicide death rate is on an average about two and a half times as high as the male rate.

SUICIDES ACCORDING TO SEX PER 1 000 CASES (McLEOD)

Me hod	In C	aleu a	In Provinces		
	Males	Femal s.	Mal s,	Femal s	
Hanging Drowning Po son Cuts and stabs Gunshot Otherwise	179 197 547 59 87 51	346 562 16 29	868 854 168 65 20	278 5 6 119 11 —	

Age.—The suicide rate increases as in Lingland from puberty up to fifty or so and then declines—Child suicide is not un common in India.

Mode of Sucade—The means of smudde vary according to local conditions such as the presence of a river or lake or accessibility of weapons or fire arms poison etc. In India the means chiefly employed are (1) drowning (2) hanging and (3) poison Drowning is the mode selected by about

Dr W Wynn Westcott Trans Med Leg Soc 1904 II 85

three fourths of the female sucides of the Madras and Rombay Presidencies, while more than three-fourths of the male sunders in the same provinces hang or drown themselves in about equal numbers. In the Panjab one half the male and nearly on-half of the females sucides choose hanging, while drowing is selected by only about one third of the females and one-sixth of the males. Hanging also is the mode chosen by over half of the female and about one third of the male suicides of Calcutta. Posson usually areense or optum is chiefly used as a means of suicide in certain special localities eg in districts where the poppy is grown and in the towns of Calcutta and Bombay For details of suicide by poison, see 'Poisons' Gunshot is more commonly used by Europeans and Enrasians.

The difference in the mode of death selected by would be sucudes in different parts of India is seen in the following table from which it will be seen that whereas in Calcutta the favourate means is poson in other parts of India the preference is for hanging then drowning, and thrilly posson, whilst femiles prefer drowning then hanging and less frequently

DOMESTO

MODE OF SCICIDE IN 1000 SCICIDES OF EACH SEX 1

Mode	England a d Male 1874 and 18 6	No bay Irest dency 1873 to 1878	Mad as P est t nerg 1872 1 1870	Canjab (two yeare 1812 and 1818)	Calcut a (Town)	Mad as (Town), 1812 to 1818.
Hanging Drowning Poison Cuts, stabs etc Gunshot Otherwise	274 184 90 290 8° 90	882 456 91 71	471 443 25 49 {	500 174 184 26 32 84	826 74 453 84 63	163 623 66 96 32
Hanging Drowning Poison Ed Cuts stabs etc Gunshot Otherwise	254 809 155 192 9 68	185 767 87 11	179 790 25 2 {	161 854 81 18 —	519 26 429 26 —	937 21 —

The various forms of suicide and questions therewith are detailed under the respective modes of fatal violence, would sto

<sup>1</sup> K. McLeod On Sunade in India



Self inelicied Wounds feigning attempted Homicipal Wounds (On left upper arm)

To face p 151 )

## Is the Wound Homicidal or Suicidal or Self-inflicted?

This question is answered by: (1) The appearance and position of the wound. (2) The direction of the wound. (3) The number of wounds or injuries. (4) The position and surroundings of the injured individual

# 1. Appearance and Position of the Wound.

Although in many cases, these characters afford no indication as to how, or by whom, the injury was inflicted, a presumption more or less strong arises from the following circumstances ·--

Against self-infliction and in favour of homicide or accident, in the case of stabs passing right through the body, and cut throat extending to the vertebre; these being larely selfinflicted wounds

Case - Suicidal cut throat, wounding vertebra - Dr A. Powell relates a case of a European who committed suicide with a razor and hacked the vertebra without wounding the carotide. He did this by throwing his head back during the operation. In this position the carotids are on a plane posterior to the anterior surface of the vertebra.

Case -A Hindu male, aged 35, committed suicide in the court lock up, Bankipore, on 17th July, 1897, by cutting his throat with a knife. His body was examined the same day Marks of injuries, a transverse incised wound in front of the neck, about five inches long and four inches broad, down to the spinal column, the trachea was divided out below the creod cartilage, the asphagus and the right carotid artery were cut through The divided portions of the fractical way and the right carotid artery were cut through The divided portions of the fractical way. Singh, Ind. Med Gas, 1902, p 230.

Sacke—Taylor, Med Jur., I pp 512 and 513, mentions two saiddal cut throat cases, in which the spine was wounded. In the first

(Ryan's case) there were three cuts on the vertebra, but the large vessels of the neck were unwounded In the second (Marc's case), respecting which Taylor remarks that a wound so extensive is rarely seen in a case of suicide, the large vessels were wounded, the windpipe and

gullet cut through, and the vertebra grazed

So also stabs, and incised wounds on the back, and gunshot wounds, unaccompanied by any blackening of the skin or scorching of the clothes, are only likely to be self-inflicted if some special contrivance has been used to fix, or in the case of a gunshot wound to fix and discharge from a distance, the weapon employed Several contused wounds are only likely to be self-inflicted if the person is insane, or the case is one of suicide by precipitation from a height.

In favour of self-infliction.-In the case of incised wounds. if these are all slight, or if severe they tail off at one end into a superficial scratch, and are in the accessible position on the

left side in the case of a right handed individual (see Plate I) the presumption is in favour of self infliction. In suicidal cases in about four fifths of the cases the head is chosen for injury

Case - Self inflicted wounds ferening homicidal - The Lansdowne Road Mystery -Flora McLeod (see I late I) was nurse to a European family in Calcutta in 1901 She had the baby of the family in her charge. and one night it was found dead. The nurse ran out into the verandah and alleged that a native had come into her room at midnight and stolen her jewellery had knocked her down in the bathroom and stabbed ber repeatedly and killed the child The stale 11 in number were skin deep and evidently self-inflicted. The scratches were all on the left unper arm All were distinct scratches and considering their length compared with the circumference of the arm coul I not have been inflicted by stabbing thrusts with a dagger or knile. The police believed that she produced them with the point of a pair of scissors. They were in a position where she could conveniently produce them with her right hand. The police surgeon gave it as his opinion that they were self inflicted. The child was 16 months old and was reported to have died of suffoca tion. It transpired that proceedings for a divorce were being taken against accused by her husband No trace of the alleged burglar was found.

Gaze —Wounds self-inflicted in support of talse charge — In 18-9, three native women and two children were found lying dead in a heap with their throats cut in their bung-low at Beth! The husband of one of the females gave the alarm stating that the erime had been committed by dwoots (gaug robbers) who had also wounded and bound him! It however soon became evident that the man was the murdery

His wounds were very slight the chief one being on the thigh about three unches long and in no part penetrating completely through the true skin the others were shallow ceratiches exactly parallel to the first and the amount of blood on his clothes and body was much greater than could have flowed from his wounds —Cheucter Med Jur n 357

Case — A Museulmann at Debra Isnail Khan examined by Surgeon G P Mackenrie in September 1872 had a slight cut scarcely skin deep and two or three smaller scratches on throat. She accessed her bushand of attempting to murder her. The impures were pronounced to be very triling an I probably sell indiced. She was convicted of bringing a false charge, and sentenced to six months imprisonment — Harvey  $s \operatorname{Imp} Md Le \operatorname{Le} \operatorname{Fe} \operatorname{P} \operatorname{117}$ 

In favour of infliction by another person, in cases where severe mosted wouls is reascentipmed by cuts on the hands of the injured individual and in female subjects—if the circum stances evolude accelent—in cases of wounds of the genitals or castration or multilating wounds of the nove, cars or breasts. In India wounds in famales in the situations just mentioned indicate jealously or punishment for adultery as the motives for their infliction, and wounds of the genitals in male subjects often also indicate the existence of the last mentioned motive is or religious monomynia—as melancholics sometimes make a 'cr' clean sweep of penns, eventum, and testes. Blows or cuts on'

In favour of accident—the location of the wound on an exposed part of the body and one side only

# 2 Direction of the Wound

It may first be noted that while a non self inflicted wound may have any direction a self inflicted wound usually has a particular direction dependent on the part wounded and the hand employed Hence it is important where possible to ascertain whether the injured individual is or was right or left-handed or ambidextrous Vext an endeavour should be made to determine the beginning and ending of the wound this of course presents in difficulty in the case of punctured and non traversing gunshot wounds. In traversing gunshot wounds the beginning an I ending of the wound are indicated by respectively the orifice of entry and the orifice of exit It however by no means follows that the direction of such a wound is represented by a strught line drawn from one orifice to the other For example a projectile may be deflected by a bone or by tough fascia and take a circuitous course eq may be deflected by a rib and pass half round the body without penetrating the chest or pass half round the head without penetrating the skull

Dr. A Powell cites a case of a sergeant of the 8th Mounted Infantry in the Bort Var hit by a Mauser bullet close to the spune. The entrance wound was linear. The bullet travelled right round the ribs and was removed from below the sk n close to the sternum between the third and fourth costal cartilage. Had it come out of itself the ent would doubt less hape been purch smaller than the entrance wound.

In the case of incised wounds made by a drawing cut if one end is abrupt deep and unbifurcated and the other shallow and tailing off or bureated the probabilities are that the former is the beginning and the latter the ending of the wound In deep incised wounds the plane of the wound must be noted (see Case p 159)

Self inflicted incised wounds, as a rule (1) end on the same side as the hand employed and (2) begin from below if on the lower part or from above if on the upper part of the body Self inflicted incised wounds of the throat as a rule possess the first of these characters but may or may not possess the second vertey may be transverse or run from above down or from below up Self inflicted stabs and gunshot

<sup>1</sup> K MoLeod from the cases reported in Bengal in 1869 considers that suicidal wounds of the threat are generally high up on the neck between the

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wounds (in right-handed persons) run, as a rule, from right to left.

Homicidal wounds may have any direction, and are specially hable to have the same direction as self-inflicted wounds if the assailant was standing behind his victim, at the time of inflicting the injury (see Case, p 159) Frequently in homicidal wounds the direction of the wound indicates the relative position of the assailant and victim, it must be recollected however, that the direction of the cutting edge of some weapons is transverse to the line of the handle. This is the case in the carpenter's adze and the matteck (gainti) or spade hoe (phaora or Iudali) commonly imployed by cultivators in India

## 3 Number of Wounds or Injuries.

A single wound or injury may be the result of accident, self-inflicted or inflicted by another When many wounds are present self infliction and accident are, to a certain extent, contra-indicated Multiple wounds may, however, be -

(a) Self-inflicted -- Several incised wounds, all slight, are sometimes self inflicted with the object of averting suspicion (see Case, p 152), or of supporting a false charge (see Case, p 152) In smoidal cases also eg cut throat, one severe in-, cised wound is sometimes found accompanied by other slight cuts More than one severe incised wound may, of course, be self-inflicted but the greater the number the stronger the indication in favour of homicide Several contused wounds are only likely to have been self-inflicted in the case of insanes. or in cases of suicide by precipitation from a height. Suicide by precipitation excluded, self infliction is contra indicated, if each of two or more wounds is of such nature as to cause immediate insensibility, or immediate de th Very severe wounds, however, may not cause immediate death, or immediate insensibility and hence the existence of two such wounds may still be consistent with self infliction, eg Hayes Agnew concludes from recorded cases that it is possible for a suicide to shoot himself "first in the head, and within the lapse of a minute inflict a similar wound on the heart," or the tersa 1 Very great eaction, therefore, must be exercised in drawing a

hyoid and thyroid, more on the right than on the left side and are either transverse or incline from below upwards.—Beng Med Leg Pep, 1869, p 57 Casper however white admitting the difficulty of ascertaining the commencement and end of wounds states. In sucudal wounds of the threat the wound certainly usually runs from left to right and from above downwards. If p 13

Annals of Surgery, Vol. VI p 152

positive inference against self-infliction, simply from the fact that more than one severe wound is present on the body

(b) The result of accident, eg a fall from a height, an accident from machinery, etc. In such a case, however, homicidal violence is not contra indicated, unless all the injuries are to be accounted for by the supposed accident. Thus when the accident indicated is a fall from a height, and there are no projecting objects against which the body could have struck during its descent, severe injuries on both sides of the head contra indicate accident (see Cases, below and p. 159)

## 4 Position and Surroundings of Injured Individual.

Under this head should be noted -

(1) The position and attitude of the body and its relation to surrounding fived or large objects—This may directly indicate self infliction or accident, as, for example, when the body is found at the foot of some high object, from the top of which it may have fallen. It must be borne in mind, however, that an attempt is sometimes made to conceal murder by placing the body of the victim in such a position as to point to accident or self infliction as the cause of the injuries. With this object the body (as in Case below) may be placed at the foot of a high tree, or on a railway hine, etc.

Case -Attempt to conceal homicide by fabricating evidence of ? accident -The body of a man was found at the foot of a mange tree. with a bundle of mangoes tied round the neck On the body was (1) Around the lower part of the neck, extending from right side of traches to posterior edge of left sternomastoid muscle, a brown mark, as if from pressure of a cloth or large cord (2) Abrasions and scratches with dust adhering on right front of chest and anterior and outer aspect of right arm (3) On right side of face and neck several bruses elongated in shape (4) Bruses and abrasion over night required. shape (4) Bruises and abrasion over right parietal protuberance Blood in large quantity extravasated under scalp. All right half of the skull broken into fragments, fissures radiate in all directions, all the fragments irregular in shape, and lying loose on the brain. An opinion was given that the injuries were caused by blows from a weapon, not by a fall from a tree Subsequently one of the accused confessed that he. deceased, and several others, had been stealing mangoes, when a dispute arose as to the division of the plunder, and some one knocked deceased down with a lath. The body was then conveyed some distance (probably dragged along the ground) and placed under the tree, so that it might appear that a fall therefrom was the cause of death -Asst Surg Duncan in McLeod s Beng Med Leg Rep , p 41

In such cases discrepancies between the nature and situation lof the injuries, and the method of production indicated by the position of the body, point indirectly to the employment of homicidal violence. In other cases also indirect indications

of the employment of homesdal violence has be afforded by the position and attitude of the body. This is so when the injuries present are of such a nature as to make it improbable that the josition and attitude in which the body was found resulted from effort on the part of the injured individual. For example, the body may be found at a distance from the place of infliction of the injury or in an attitude widely differing from that in which it must have been in, directly after its receipt eg the cause of death being fracture of the skull from a blow on the bod, of the head the body is found in an ungright position supported against a high thick hedge at its back. The possibility bowever even when the injuries are extrinely severe of considerable effort on the part of the injuried individual must not be overlooked. It has already been pointed out that a certain amount of power of voluntary incoment may still be retained after receipt of very sever, wounds and it now may be pointed out that very considerable power of locomotion may remain even after the receipt of almost immediately mortal injuries.

Case — Locomotion after mortal injuries — Dr. A Powell relates a recent case in which a boy of 18 ran at least 120 yards from where he was mortally shot through the heart Post mortem examination showed that a buckshot had pierced the anterior wall of left ventricle and looked in the interventiruellar sentum

Cuse —He also gives a case of a man who was stabled by a pitchfork and was driven three miles and lived in hospital for four hours before

he died. The post reordem examination showed left suricle to have been

penetrated

Gase—An old man was severely beaten with a split bamboo after

the beating he walke I to his house a distance of about half a mile, and
duc almost mance lastely 0, most notion examination the seventh and
eighth ribs on each side were found functured the splicen ruptured and the
right lobe of the liver all but durited transversely by a bringated grade
in the liver of the liver all but for the severely by a bringated grade

8 inches long and 13 inches deep and broad—Int Med Gar, 1807,
p. 200 Dr. Hutchinson

(2) Condition of surface of the body, or of the clothes or other coverings thereof—Important points to note under this head are (a) l'equilarities of the clothes likely to have nodified the injury received or to affect the condition of the weapon used, et a thick turban may cause a severe blow from a llunt weapon to produce a simple, instead of a compound, fricture of the skull, or fibres derived from an article of clothing, worn over the injurid part, may be found adharing to a weapon, and thus indicate it to be the one which was used (b) Stains of blood or other matters. It is possible that these by their nature or position may indicate homenical violence, eg stains of senioral fluid on the clothes or both of a femile corpse, or a mark of a bloody right hand on the right hand or arm of injuried.

person Again in the case of guishet wounds blackening of the skin at or of the clottle swom over, the scat of the wound by indicating nearness to the body of the worpon at the time of its discharge is confirmatory evidence in favour of self-infliction, just as the absence of such marks by affording a contrary indication is evidence of more or less weight aguist self-infliction Stains of mud or dust on the surface of the body with abrasions in certain situations on the skin may indicate dragging of the body along, the ground and afford possibly confirmatory evidence of homeidal violence (c) Cuts or rents on the clothes. Want of correspondence in startion between cuts on the clothes and wounds on the body is often found when the wounds have been self-inflicted for the purpose of supporting a flase charge or averting suspicion.

(3) Nature, position and condition of objects on and near the spot where the lody was found or the mjury inflicted -The objects found may be weapons sharp stones articles of clothing fragments of clotles etc and these or other objects may bear stains of bloo! Again near the body or place of injury may be found bullet marks footprints of persons other than the deceased or marks indicating that a struggle has taken place If a weapon is found its position is of importance This may indicate self infliction as for example when the weapon used is found tiglitly grasped in the hand of the dead body as already instanced. A weapon however found loosely lying in the hand of a dead body may have been placed there with the view of fabricating evidence in favour of suicide (see Case p 159) The discovery of the weapon used at a distance from the body indicates homicide in proportion to the improbability of its having been placed where it was found by the deceased . Here obviously the question of what power of effort or locomotion remained to the deceased after receipt of the injury must be considered. As regards the nature and condition of the weapon found it may be pointed out that peculiarities in its shape etc by their agreement with the shape of the wounds on the body may indicate it to be the weapon which has been used and this again may be confirmed by the weapon showing signs of recent use Marks again indicating ownership present on the weapon may be important as evidence in favour of the guilt or innocence of the accused. The non-discovery of the weapon used especially if the injuries are likely to have caused rapid death or insensibility obviously points to homicide As regards sharp stones the presence or absence of these is of importance as indicating the possibility or otherwise of the injuries being caused by forcible accidental contact therewith

A compound fracture of the skull for example a common result of a blow with a blunt weapon, may be caused by a fall on a sharp stone, but is an exceptional result of a fall on a flat surface 1 As regards articles of clothing or fragments of clothes the presence of these near the body, or grasped in the hands of the deceased, may indicate that a struggle took place shortly before death between the deceased and some other person, and thus indicate homicide Fragments of hair, again belonging or not belonging to the injured person may be found in similar situations, or adhering to weapons, and may prove of much importance in evidence Stains of blood may be found on a weapon indicating its recent use, or on other objects in the neighbourhood of the body or the spot where the injury was inflicted Sometimes the appearance and position of such stains is important as indicating the circumstances under which the injury was inflicted (see Cases pp 153 and 159)

Case - Circumstances under which wounds were inflicted inferred from position and form of blood spots - In the case of Spicer, a woman was killed by a fall down a stair fracturing her skull and spine A branch of the right temporal artery of the deceased was found divided and on the wall at the top of the stair on the right hand going up several spots of blood were found, of the form and appearance of spots resulting from the spouting of a small aftery I rom the form and position of these spots it was probable that decease I received a blow on the head while ascending the stair, and fell backwards to the bottom the fall causing the injuries which resulted in her death -- Taylor, Med Jur, I p 54J

Bullet marks or shot-holes, by their situation, may indicate the position of the assailant at the time the weapon was discharged (see Cases below) The distance at which the shot was fired is usually related to the question of premeditation, as it is manifest that a shot fired from a considerable distance could not have been fired in the heat of a sudden quarrel

Case - Evidence from bullet marks - Several shots were male clously fired into a church. Some of the bullets traversed a window making holes in the class and struck against a wall on the other side of the church A straight line from these two no nts reached a window on the opposite side of the street, from which it was afterwards ascertained that the shots had been fired .- Taylor, Med Jur . L p 689

Case -" Sir Astley Cooper, called to see Mr Blight, of Deptford who had been mortally wounded by a pistol shot interred from an examination of the localities that the shot must have been fired by a left handed man The only left handed man on the premises at the time was a Mr Latch a particular friend of the deceased who was not in the least suspected This man was however, subsequently tried and convicted of the crime, and made a full confession of his guilt before execution -Woodman and Tidy, Med Jur , 1091

As regards footprints, Ogston I remarks that the impression left by the naked foot varies in the same individual according as to whether he was standing, walking or running at the time. Lastly, objects in the neg-bloorhood may be found overturned, broken, or showing marks of injury, pointing to a struggle haing taken place.

As an illustration of the application of many of these points to a particular case, which in itself exhibits many points of interest, the analysis of the case of the Empress v Sudhabade, by Dr L G Russell is interesting also as a case

of special plending for the prosecution.

Some of the obvious defects of Dr Russells reasoning are pointed out in remarks enclosed within square brackets. He does not appreciate the fact of the extreme runty of "cadaveric spasin", nor does Taylor if by thus frequently" (p. 164) he refers to cadaveric spasin. It is time the profession recognizes the extreme runty of cadaveric spasin. Nor does he think it probable that a ruzor could be notched by striking the bone in suicidal cases, whereas Professor Powell has cited a case of a ruzor notched by undoubted suicides in which he found the steel fragments embedded in the vertebra. Nor can anything be inferred from the expression of a corpse, the muscles of expression relax in death, and practically all faces are placid thies decomposition has set in or the jaw has dropped—phenomena which have nothing to do with the passions or temper of the man immediately before death

Case —Fabrication of evidence of Sucide in Homicidal cut threating v Sudhabode Bhattachayi.—A native girl, aged 11 years as found dead in her bed with her threat cut and a blood stained razor her right hand. She and her husband had retured to their befrom at 10 ps on the 12th September (1888) the husband left the house at A.M. on the 13th information of the girls death was given to the police at about 120 ps on the 13th 1 lost mortem examination was beld at 730 AM on 14th

THE POINTS WORTHY OF SPECIAL NOTICE WERE -

2 I ace calm, eyes half open

4 Three wounds of spine and of gullet, although tissues of right side

<sup>1</sup> Absence of all signs of a struggle such as cuts on hands, bruses (either on or beneath shin), marks of ligature (compression of nose, or mouth) hair not disarranged or cut, clothes not torn or cut

<sup>8</sup> Trachea divided between 4th and 5th rings (\*c near sternum) while the wounds of spine were 14 inches or more higher up [Dr. it uses 'spine' very frequently, meaning doubtless spinal column or vertebra]

<sup>1</sup> Lect on Med Jur p 63 2 Ind Med Gaz 1889 pp 33 etc

of neck marked by one incision only like those on left side, tracheal

wound also sincle 5 Plane of wound upwards, direction transverse, croscept shaped, both ends equally high

6. Regor mortes well marked and universal, both hands in identically

same attitude as regards fingers, and firmly fixed so by rigor mortis

fingers

(c) Direction (d) Redundancy (e) Hant (f) Lowness on neck (g) Regularity II The bleeding—(a) Direction. (b) Nature of stains on right hand and arm and on clothes III Razor in right hand—value of this fact IV Death almost instantineous. V Wounds were inflicted during life and were the cause of death. VI Absence of cries and of signs of struggle | Lach of these points deserve separate consideration

I Wounds -(a) The severity The head was nearly cut off, both common carotid arteries, both internal jugular veins, the pneumogastric and phremo nerves on both sides, all the muscles of front and sides of the neck were divided as were the traches and esophagus, the cervical spine was cut In addition to this wound, there were two others, each reaching to and wounding the spine. It will be shown (b) that the upper and great wound, which divided every structure of front and both sides of the neck, was probably the first sufficted After infliction of such a wound, could deceased have inflicted two others, each penetrating to and wounding the spine, and each involving a distinct and determined act of volution Taking the wounds in any other order, could a suicide bave inflicted the two others after any one of them? It is true that authorities on legal medicine have stated that severe and extensive wounds of the throat have been inflicted by suicides (Guy, 8rd Edn , p 208) Taylor (3rd Edn , 1883, Vol I p 518) also says, 'there is no ground for the assertion that extensive wounds of the throat are incompatible with self destruction " This is, however, qualified by a further opinion expressed by Taylor (idem , p 519) peculiarly applicable to the present case, which will be quoted later on (in case Reg v Edmunds) The extensive nature of the wounds must, moreover, in the present case, be considered in relation to the age, sex, and state of mind of deceased, the race tendencies, and the nature of the weapon used Deceased was an immature, non muscular girl of 11 years The tendency of female suicides in India especially of those of tender years, is to destroy themselves by means (poison, hanging, etc.) other than the use of cutting weapons Moreover, although, as 14 well known, instnes will inflict on themselves injuries extreme in severity, and showing astonishing persistance and determination (see Taylor, 3rd Edn., 1883, Vol I p. 512), yet there was no allegation or question of insanity in the case of deceased -the evidence, in fact, indirectly establishing the reverse. With regard to the weapon found in the right hand, and with which the wounds must have been inflicted had they been suicidal, this was a razor of ordinary pattern. Deceased can have had no shill in the use of such a weapon. could have had no occasion probably ever to have handled one Yet to have inflicted wounds in any way approaching in severity those found on deceased, a suicide would require some knowledge of the use of a razor, and must certainly have exerted a degree of muscular strength which the deceased, an immature, non muscular girl of 11, did not in my opinion possess. In most of the cases in which exceptionally severe injuries have

been self inflicted—more especially by women—the weapon has been a knife with a fixed handle, leading itself radily to a firin grp—not a razor, with a logse blade (bee below) It will be instructive to compare with the present case, certain others which are collected by Taylor as typical of exception ills severe injury in out throat case.

Case—Suicidal cut throat.—Woman, spine wounded in two places, but through muscles of back and of side of neck, left internal jugular toun opened, all other large vessels escaped, and all the large nerves, other incisions (Taylor 3rd Edn, 1883, Vol I p 528) Noto—Person, a adult, manuacal, weapon, a table kink e e with a firmly fixed handle easy to grip, all large vessels and nerves escaped injury—except left internal jugular vein, the spine was rached (and wounded) through the back parts of neck, not through the front, where the important structures lle Taylor says of this case that it 'might be suicidal', but the ver dict was one of murder [Her. Dr Russell disregards the verdet in heading case "auncide"] Compare present case—All large vessels and verves of neck divided, spine cut in three places girl of II, weapon (mazor) with loosely jointed handle ne grup, no suspicion of lunaey

Case—Ryan's case—Man, three cuts on spine of neck, but both carotids and jugulars escaped and therefore almost necessarily, all large nerves (Ibid, p 512) Quoted as a case of exceptionally severe injuries for a suicide—even for an adult male, probably accustomed to use of a

razor

Case - Marc's case - All inuscles of front of neck, the windpipe, gullet, both jugilars, both carotil afternes divided and the weapon had "even grazed the anterior ligaments of the spine Toylor adds (bita) 513), "A wound so extensive as this is rarely seen in a case of sucide Compare present case - All great afterios and veins and nevers of neck divided and not mirely alment ingaments of spine "even grazed," but three incisons into spine of neck. Although the above three cases are placed on record as of exceptional severity for suicide, yet in no one of them is there an approach to the severity of injury found in the present case, even though in the former, all the conditions favoured exceptional severity, viz adult age male sex, or if a woman, the presence of mains and the use of a king with fixed handle

Case—Reg v Elmunds—Three incusions, front of neck, all the great vessels and nerves divided, also traches and quillet, two wounds of spine, deep ones "This greatly resembles the present case (K Manun Deh) Held (although decased was an adult) that "it was impossible for any person to inflict such impures on himself". Taylor adds "The hacking of the spinal column in two distinct places "fire fywlat evidence that it was after?] the carotid arteries and jugular veins had been cut through was alone sufficient to justify this opinion. Suicide may graze the figuriests in front of the spinal column, but that they should make deep mensions into the bones. Is a proposition contrary to all [inits of experience and probability"—18nd. p. 518

Case.—Caso of Farl of Disex —To the effect that repeated wounds of the front of spine could not have been sell inflicted, because the division of the vessels and nerves, which must have first been cut, would have rendered the person powerless. When, in these cases, the injuries were held to have been impossible of self infliction, even by adults, can it, for a moment, be accepted that injuries of as great severity could, in the present case, have been sell inflicted by an immattive grid of II years of age? I maintained the improbability—nay, impossibility—a view which the jury unanimously endorsed. His Lordship, in summing up.

observed 'On this point, there was not a doubt in the world the wounds were homicidal and not suicidal."

(b) and (c) Direction and order of infliction of the three worm is of the neck. The great wound had the appropriate of having been inflicted from left to right for its left extremity was shallow for two thirds of an inch, and then rapidly despend, while its right extremity ended in a shallow tail 14 mehes long, the skin being alone injured at its termination This great wound had apparently been caused by a single sweeping incision. for its upper margin was entire and clean cut neither skin nor tissues showing any sign of two incisions having run into one another, no notch or tag anywhere Now, although the spine and cullet had three incisions in them, the windpipe and the divided tissues of the right side of neck had only a single incision through (or touching) them just as those of left side had How was this to be accounted for ' It seems clear that the two lower wounds which showed superficially a little to left of median line of neck for 1 inch, and then disappeared into the great wound, must have found a gaping opening and dropped into it straight to the spine, which each wounded. A previous incision must have existed, and the tissues have been gaj ing from its retraction

If it be assumed that either of these lower wounds was the first inflicted then the tissues of right side of neck must have been divided by it these had only one incision, therefore, in that case, the great upper incision which began on left side of neck cannot have cut the tissues of right side and therefore must have joined in towards the median line with the pre existing one of right side. Had this been so. it is scarcely possible that there should have been no sign of the junction There was none The upper margin of the great wound was clean cut and entire through its whole length. The great incision round both sides of neck was then the one first inflicted. This being granted, the improbability of deceased having been able to inflict the other two wounds is far greater than if either of the lower ones had been the first, as the former divided the structures of both sides of nech, the latter could only have divided those of the right side. Not only the great upper wound, but also the two lower ones must have been inflicted from left to right For, had they been inflicted in reverse direction, what could have caused them to leap up almost vertically from the spine (which they cut) nearly It inches to become superficial almost at once? It was not contact with the inner end of left clayicle for this was un touched, nor mere contact with the spine for the great incision wounded the spine equally, and still kept on its deep path.

The appearances were only capable of explanation on the supposition of the two lover measures having begun as the shallow melasons described on the right side of median line, and, therefore, having been inflicted from left to right. The mere direction of all the measures—from left to right—had no great practical bearing on the question of homicale s unede, for deceasal a right handed person, would herrelf have cut in that direction. The direction is that in which a right handed person militaing the wounds, homicalfully, from behind deceased would have made

them, this fact supports the theory advanced as to the method of commission of the homicide

(4) Bedondancy and severity of the wounds was marked and far in excess of what was necessary to take life a That redundancy is fur more frequent in homseidal than in suitedal wounds is well known. The frequency of cases of attempt to commit vasculed in the Police Courts and Hospitals is confirmatory of this question. Dr. K. Velkeel has shown that Indian records farmly establish this fact (Mof. Lee Ref. 1889).

(e) Plane of wounds, upwards This is are in succidal wounds, more common in homewald ones, most common when the latter have been inflicted, from behind, on a person lying down In the latter case, the plane of the wound is almost necessarily upwards Proofs that the plane was, in this case, upwards —

1. Skin and soft parts—Although retraction had greatly altered the relative position of the parts yet, taking the upper margin of the great wound, its ends were from 11 to 2 mehrs higher than its middle

2 Tracheal wound - This was in front between the 4th and 5th rings; posteriorly, it divided, obliquely upwards, the ends of 4th ring

B Incision of spine -Plane upwards

- 4 The difference in level between the wound of the traches and those of the spine (behind it was about 11 to 2 inches. The traches wound, between 4th and 6th rings was on a height with lower third of body of the cervical vertebra. The loner wound of spine was at upper part of body of 6th the wound had, in passing from undippe backwards to spine rises about 1½ to 2 linches. If the lind of deceased had been drawn backwards at time of infliction of the wounds this would not doubt, account for much of the difference of level but not I think for all For, in my experiments fon the dead subject! I could not raise the level of the 5th ring of the traches more than one inch aven by traction of the had backwards, which sufficed to draw the body along the table
- (f) Lowness in the neek of the wounds. Succidal wounds are rarely low in the neek, they are usually high up in a region of hyoid bone or larynx. Homicidal wounds are frequently low down. General expenence confirms this (see also Taylor 3rd i di. 1883 Vol I p 512)
- (c) Regularity of the wound has been held to indicate sized by some, hornically by others. In the case of a struggle it is probable that a homicidal wound would be irregular. But, on the other hand, "a munderer by surprising his victim from behind, by directing his attack against one who is saleen and such a surprising the following his attack against one who is saleen and yearly produce a regular and clean cut wound, especially when a large one Could a girl of II years of age be credited with the amount of nerve required to nearly decapitathe herself with steadness and regularity?
- II—The Bleedung—(e) Direction of the blood effused All the blood offused from the wounds of the neck had run directly back wards, towards the back, sopping with blood the posterior parts of the body and trunk There were no marks of any stream of blood having run down the neck, chest, shoulders or clothes, se in direction from liead to feet. This shows that deceased must have been lying on her back during the whole time that bleeding was going on, se from infliction of wound to death. This fact was of the highest practical importance in the case. For I gave it as my opinion that it was impossible for deceased, while lying on her back, to carry a zoro so far round the throat as the wound extended (i.e. all around, except for 1½ inches behind), and at the same time keep the cutting edge against the throat, on the right suile (the right hand being used), the hand could not be got round so far unless the head were raised to enable it to get beneath. That deceased a head was not so raised is almost certain, for had it been, even for a moment, blood would have streamed down the neck and chest or shoulders, and told the tale, for bleeding was at that time going on, the vessels having been severed. Three were no marks of any such streams

Moreover, it is rare for a suicide to cut the throat in a recumbent! posture . (Taylor, Vol I p a45) See also cases Reg v. Courconser, Rea v Constance Lent, and Reg v Gardner

(b) Nature of the blood stains on right hand and arm The right hand had blood stains over every part, as if dipped in blood. The right forearm was free of blood, except along its lower and inner edge, where it had lain in contact with the blood sopped clothes There was no mark of a jet or spurt of blood, nor of any individual drops, on this hand or arm or on clothes of deceased If the case had been one of smerie, the right hand (containing the razor) must, at the moment of severing the vessels. have been in close contiguity with them. The arteries, especially the smaller ones, would have at once jetted out blood on being cut Could the hand and forearm, if naked, or the clothes, if covering them, have completely escaped being marked by such jets? They had entirely escaped

III -- Razor in right hand-value of this fact. At the time of nost mortem examination the razor was found loosely supported in the right hand between the upper phalanx of thumb and the palm , the fincers did not touch The case was, however, complicated by the razor having been removed while the boly was being conveyed to the dead house, and after wards replaced before I saw it The Inspector, who saw the body an actu on the bed before removal, deposed that the ragor was at that tune not tightly elenched that he removed it easily without any force his object being to prevent it falling out and getting lost on the way. The defence strongly contested the point whether the rayor could not at some carlier period than that at which I examined the body have been firinly grasped by cadaveric spasm It was admitted that, had the razor been firmly grasped by cadaveric spasm, it would have been telling evidence in favour of suicide

Taylor notes (Vol I p 65) "Razors and pistols are thus frequently found in the hands of suicides" Had it ever been so grasped, in the present case, it could scarcely have arisen from any cause other than the fixation by cudaveric spasm, at the moment of death of a voluntary grip of the weapon during life. For this condition cannot be artificially induced after death. I maintained that there was proof that the weapon had never been fixed in a tight grasp by cadaveric spasm. For, had it ever been so clenched, the razor could only have come into the loose state found by me owing to one of two causes viz cither by the ingers having been opened by some one, or by the subsidence of cadaveric spasin. That neither of these causes had come into play was clear from the fact that rigor mortis was still present and well marked in the fingers of the right hand, as elsewhere, at the time of my examination. Had the fingers been unclasped, by any person, from a grasp of the kmile, cadavene rigidity (rigor mortis) would have, to that extent, been destroyed so far as these fingers were concerned, and, once destroyed, could not have been restored Yet I found it strongly present, the fingers were rigid and resisted flexion. The hand had therefore, never been unclasped, and therefore, can never have had a tight grasp of the razor fixed by cadaveric spasin

It was suggested by the defence that a tight grasp of the razor may have been fixed by cadaveric spasm at the moment of death, but that a supervening stage of general relaxation may have loosened it, and this loosened stage have been found and fixed by supervening rigor mortis, and that this would explain the condition found The answer is plain, that cadaveric spasm is rigor mortis (early in setting in) and that when r laxation ensued, there would be no further (or second) rigor murits There were two other points indicating that the position of the fingers of the right hand had not been altered by any person, namely, that the posi tion of the fingers of both hands was identical, finger for finger, joint for joint, and that the members of both hands were in the position commonly found in death from whatever cause, te thumb close to palm, its last phalanx and the two lower ones of each finger sems flexed. It would have been a remarkable coincidence if the right hand had, after having been opened, been recomposed into such identity of position with the left. The absence of a tight grasp on the razor is however, no direct proof of homi cide; it merely destroys one proof of suicide I or a razor may be found loosely held in the hand of a suicide owing to cadaveric spasm not having occurred, the weapon having continued to he in the hand during the ordinary after death stage of relayation, and this relayed state of the hand having become fixed by rigor mortis eventually On the other hand, a razor put into the hand of deceased after death would have been found in precisely the condition in which I found the weapon in the present case (For cases illustrating this, see Taylor, 3rd Edn., 1883 pp 67 and 519, the baville case, the Gardner case, also Tidy, Part I pp 121 et seq )

IV—Death almost instantaneous This naturally follows from the whole of the large vessels and nerves of the neck having been severed That death was not quite immediate is shown by the presence of blood stained froth in the larynr below its severance, and in the bronch deceased must have breathed after division of the trackes and blood vessels

1.-The wounds were inflicted during life For the defence it was argued that the wounds of the neck might have been inflicted after death from some other (natural) cause, and that wounds, caused imme diately or soon after death, were not distinguishable with certainty from those inflicted during life, that therefore I was not warranted in giving a definite opinion that they were actually inflicted during life and were the cause of death So far as the appearance merely of an incised wound is concerned. Taylor and Aston Key found that one inflicted within two or three minutes after death showed considerable resemblance to one inflicted during life. In the present case, however, the extreme retrac-tion of the divided skin and muscles and the free ecchymosis into margins of tissues bounding the wound show this to have been inflicted during life But it was not necessary to look to the wounds alone for evidence on this point, the amount of blood loss every part of the body being drained of blood even parts so remote from the wounds as the kidney, vagina, etc., the empty and contracted condition of the heart cavities, all confirmed the conclusion that the large vessels were opened by the wounds during life Division of these vessels, after the heart had ceased beating could not have emptied the body of blood to anything approaching the degree found in the present case

VI—Absence of cries and of signs of struggle. This was prime frice evidence in favour of suched. This absence can, on the other hand, be accounted for on the supposition that deceased was taken unawares and a disabiling wound at once inflicted. There is much other evidence to support the theory that this really occurred. Ecchymosis might reasonably have been absent, even had deceased sturgled, it restraint had been applied with the interposition of some soft medium, such as the prisoner sown clothes. If such a medium had been used over head and face, it would probably have been stained with jets of blood. It should be noted that the clothes which the prisoner is believed to have worn at the time of the alleged murder, were not forthcoming for examination. There may have been marks of jets of blood on them, "I further

expressed the opinion that even had (say) the face, mouth, hands, etc., been subjected to firm holding or compression, such as would orinarily have left bruss marks, jet in the case of deceased, the harmorrhage most have been (from the great star and numbers of the vessel divided) so rapid and copious, that it is quite conceivable that no blood would be left to effuse and ecchyance at the region compressed. Deceased was not drugged into helplessness, the stomach was found healthy, crupty, and free from anythure where could excite susquent.

POWER TENDING TO FIX THE CRIVE ON THE PIRSONER.—I The period at which death of deceased occurred. 2 Could the wounds have been caused by the rafor found in the right hand of deceased? 3 Were the wounds inflicted on the deceased while asleep? 4 Higor mortis, as a test of the time deval.

1 Hour of death of deceased This point was of the gravest Im portance to the prisoner, and, as such, the opinion expressed was subjected, by the defence, to prolonged and searching criticism. The following were the facts involved - Deceased had taken a meal of chupatties, curry, and rice a little before retiring to rest at 10 r m with her husband (the prisoner) she was not again seen alive, prisoner left the house at 4 a m , deceased was found dead with her throat cut before he returned. The question to be determined was-did death occur during the period 10 P w to 4 a M , during which the prisoner was in her room, or did it occur after his leaving the house? If the murder was not committed before his leaving the house, then the prisoner was not guilty. The degree to which digestion had advanced was the factor employed to determine whether or not death occurred between the hours mentioned. At the post mortim examination the stomach was found quite empty. food, thick and fluid, which had recently undergone gastric digestion, was present in the upper small intestines, duodenum and jejunum the fact of this food being present in the duodenum, it was clear that the stomach had but quite recently become empty. The period of ingestion of the meal was known, and the nature of the food taken. The question remained-in how many hours would the gastrie digestion of such a meal be completed and the stomach left empty? If this had taken more than six hours (i.e. from 10 FM to 4 AM), then deceased died after prisoner left the house, and during his absence Dr Beaumont (in experiments on Alexis 6t Martin) found that rice was digested in one hour, barley mulh, fish, in two hours He refers to gastric digestion. His conclusions have never been disputed by any authority (see Appendix V for details also for Indian observations) Other authorities have given periods of from 23 to 5 hours as those required for the stomach to become empty after an ordinary meal (McKendrick, Pavy, M Toster, Todd and Bowman, Carpenter, etc.) By an ordinary meal they mean an ordinary I propean meal consisting of meat, vegetables, bread, etc. Meat and other highly nitrogenized foods take longer to undergo gastric digestion than such starchy foods as rice, wheat, etc. For a meal of rice and chu putties, then, a shorter time must be allowed for gastrio digestion. Sleep retards digestion, though it is impossible to express this retardation definitely in hours Digestion is more active in the young Deceased was 11 years of age, and was, presumably, asleep during all, or some part of the time she was in bed between 10 PM and 4 AM will be seen that it was not possible to state, in hours, the exact time occupied in digesting her last meal; so many modifying circumstances, including those above noted, being present. Taking everything into account. I gave the opinion that the period required to bring her last

meal into the condition found on post mortem examination would be at the outside, 6 hours—more probably some hours less Dr h McLeod, speaking as medical expert, gave the period as from 3 to 6 hours—nearer the former than latter. The death was thus shown to have occurred

before the prisoner left the house-in all probability

2 Could the razor found in the hand of deceased have been the weapon with which the wounds were inflicted? I held that it could The question was raised by the defence, in the interest of the prisoner, the razor having been proved to be the property of the prisoner To have caused the clean cut, even, upper margin of the first and great incision, the razor must at that time have been sharp edged. The soft tissues in front of spine must necessarily have been divided before the razor could have cut the bone of the spine and have thereby become notched. The edge would, therefore have remained uninjured during the incision through the tissues of the left side of neck, the part of the razor-the point-which penetrated to the spine may then have become notched on its edge, but the remaining part of the incision through the tissues in front of spine (i e on right side of neck) would be made (even and clean cut) by the heel of the razor which, being less deep in the wound, would impinge on the less deep tissues, and which would not have engaged the deep lying spinal bones and so not have lost its keen edge. The second and third wounds scarcely touched the tissues of the neck, they fell almost immediately through the gaping first wound, on to the spine, so that the whole length of razor probably impinged on the bone, and became notched on its fine edge. Could a sharp razor have had its edge turned, and finally notched (as was that found in hand of deceased) by contact with the bones of the spine (these three wounds of spine)? It probably could. On this point, see case of Earl of Essex (Taylor, 3rd I du, 1883, Vol I p 519), in discussing which, Taylor does not dispute the fact that the edge of a sharp razor could be notched by wounding the bones of the spine-he merely affirms that deceased could not have himself done this

3 Was deceased murdered while asleep? There are a number of reasons for thinking so —(1) The placed appearance of the face was eminently consistent with the taking of life during sleep. (2) The characters of the wound of neck. Its creasents shape, the ends being II mehes higher than the middle, its plane being sharply upwards, points to the great wound having been inhieted from behind while deceased was lying on her back, its clean cult regular margin points to it having been caused by a standy stroke while deceased was quuet and unresisting, probably saleep. (See case Lord W Russell, Rey & Courtoiser, Taylor, 3rd Ld., p 618). (3) The direction taken by the effused blood, shows her to have been lying on her back when the great wound was inflicted, and to have been so disabled by it as to have not moved atterwards. (4) The absence of marks of a struggle, although deceased was not furged on the statement of marks of a struggle, although deceased was not furged on the statement of marks of a struggle, although deceased was not furged on the statement of marks of a struggle, although deceased was not furged on the statement of marks of a struggle, although deceased was not furged on the statement of marks of a struggle, although deceased was not furged on the statement of marks of a struggle, although deceased was not furged on the statement of the

apparently forcibly held

Thigher morts as test of time dead. The defence made an attempt to fix the death by this means at a period subsequent to the prisoner having left the house, and thus to clear him of the murder. As the body after death had to cool through one degree of temperature only the existence of rigor mortem at the time of the post mortem examination was in keeping with death occurring before prisoner left the house. The

accused was convicted and sentenced to death

# Results Following, or Likely to Follow, the Injury?

The reply to this question must be cautiously given, as the result of injuries, whether disabling, mortal, or otherwise, depends on a variety of circumstances, especially on (1) the part injured, (2) the nature and extent of injury, (3) the state

of health and age of the moured individual.

Where death has not occurred the questions will be —"Is the wound dangerous to life?" or "Is it likely to leave permanent injury or incapacity?' The former question can be answered from the details already given with reference to the pruticular part injured Secondary dangers are, secondary hemorrhage tetanus septicemia, and erysipelas. The second question is more likely to arise in civil casse claiming compensation for loss of wage-crining capacity than in criminal, where the intent to injure is the chief factor in awarding punishment. This would be answered on general principles. The question of whether nervous shock is temporary or permanent is the most difficult to answer. 'Orneous kurt' may sometimes follow second-orly, as an indirect consequence of an injury when inflammatory action leads to a stiff joint, loss of heaving, etc. etc.

Where death has followed the injury, it is necessary to satisfy yourself that all the organs are healthy before you can

ascribe the death entirely to the wound or other injury.

# Causes of Death, etc., in Wounds and Mortal Injuries.

Some injuries causing death may be called "conditionally mortal" injuries at such as cause death owing to either (1) Disease or infirmity, under which the injuried individual labours, e.g. an enlarged spleen, or (2) The supervention of disease, e.g. tetanus, septicemia, erysipelas, or (3) Want of resort to proper remedies or treatment, as when death occurs owing to loss of blood from a wounded artery of moderate size, such as the bruchial. Others may be cilled 'mortal' injuries, or injuries intrinsically sufficient to cause death, irrespective of the existence of any conditions such as those above mentioned

Death from a mortal injury may occur by (1) Coina, e.g. from pressure on the brain of fregments of bone or effused blood, (2) Asphyvas, e.g from paralysis of the movements of requration, or mechanical interference with this process; (3) Syncope from loss of blood, or from mechanical impediment to the heart's action, or (4) Shock, as in death from concussion of the brain, or from the effects of a violent blow over the region of the solar plexus

In some cases, difficulty may be experienced in tracing the connection between death and an injury proved or alleged to have been received, thus, in the case of injuries alleged to have been received, thus, in the case of injuries alleged to have been caused by the action of external violence on a diseased organ, it may be difficult to determine whether the injury to the organ in question was or was not the result of external violence. In cases of this class, much will depend on (a) the laduity or otherwise of the affected part to rupture from causes other than externally applied violence (see 'Rupture of the Splech', Injuries to the Brain, 'etc.), and (b) the presence or absence of marks of violence on the surface of the body over the injured part, or in the tissues situated between it and the surface of the body

Case —Assault not homoude in ripture of enlarged spleen—Reg it Bysago Noshyo—Accused quarrelled with his wife and gave her a kick, which ruptured her spleen in repented immediately and was found with the woman in his arms helping her it reprinted under is 320 and 322 of Penal Code, but found guilty under is 319 and 321 bentence One year's rigorous impursonment—8 IF, Cr 27

Case—Reg v Robert Bruce—becased was trad for causing hurb' by kicking a boy who was suffering from diseased spleen. Death was the result of the kick. The judge held that the prisoner had no intention of causing death, but, considering the dangerous consequences of such as act, especially when influeted on a native in this country sentenced him to six months rigorous imprisonment—Calcutta Criminal Court, June, 1869.

When a conditionally mortal injury is alleged to have caused death owing to the supervention of discree, it may in some cases be very difficult to decide whether or not the discase is really to be attributed to the injury

In England the law seems different for according to Lord Hule 'st man be wounded and the wound, although not an itself mortal turn to gaugene or fever, this is homeoide in the aggresor, but though the fever of gaugene be the immediate deuse of death, yet the wound, being the cause of the gangreso or fever, is held the cause of death—cause caus it is sufficient to constitute number that the party dees of the wound given by the prisoner, although the wound was not originally mortal but became ou in consequence of negligence or unskilful treatment "If a man' says Lord Hale, "has a disease which in all likelihood would terminate his life in a short time and mother gives imm such a blow as hasters his death, this is such a killing as constitutes murder. Disease of the spleen, however, is not even a disease which need for the more fastal

Mortal injuries causing death by coma, asphyxia, or liemorrhage leading directly or indirectly to syncope, are not likely to present difficulties of the kind just alluded to In some cases, however, of death from shock, it is possible that it may be very difficult to trace the connection between death and the alleged violence. With reference to this, it may be pointed out that death from shock may occur (1) without any mark

of violence being present—this has been often observed in cases where the fatal slock has been due to a violent blow over the I region of the solar plevus, or (2) a single slight bruise only may be present as in many reported cases of fatal concussion of the bruin, or (3) as often occurs in cases where persons have been severely beaten from the combined effect of a number of slight injuries cach by itself totally insufficient to account for death. In cases such as these it is especially important that it e post man tem examination should be complete as much may depend on the medical officer being slight to state (if it be so) that no appearances were present indicative of a cause of death other than the allered violence

## Examination of Stained Articles, Blood Stains, Seminal, and other Stains

Staned serpons clothes bits of furniture plaster mud etc furly be sent for examination in cases of alleged wounds rape and unuatural crime. These stained articles are usually passed on by civil surgeous for want of the requisite apparatus and test materials to the chemical examiner for his expert report. In sending such articles the same strict precautions as to labelling estaining etc. must be taken as in poisoning cases (av.)

### PRELIMINARY EXAMINATION OF STAINS

- 1 Note down carefully an exact description of the staned 'ritcles weapons etc submitted to you for examination to enable you afterwards to identify the articles as the whole case may break down if you cannot identify in court the article from which you have examined the stun. Note the number shape size colour consistency of stains on what part of weapon and on which side of the garment the inside or outside and if more than one garment stained whether they are stained in a corresponding part. In important cases a photograph should be taken of the stained garment or article before removing any of the stain.
- 2 Cut out part of the suspected stain from the article, and divide each part into at least three portions for tests and control purposes and carefully preserve as much as possible of the original stain for exhibit afterwards in court

Authority to cut out port one of the exhibits must be first obtained from the magistrate of the place whence the stain is received.—bee Form in Appendix IV

These stains may consist of (1) blood (see p 171) (2) semen (p 297) or (3) other matter such as brain substance which may be detected microscopically by its anatomical structure



a —Human Blood Corpuscles × 400 b —American Blood Corpuscles × 200 (From Micro-Photographs by Dr. II. Odbea.)

#### CHAPTER VI

#### BLOOD-STAINS

[BY LT COL W D SUTHERLAND, MD, IMS]

Appearance — When a blood stain comes to be examined its colour may be anything from blackish through reddish brown to a dirty grey—very unlike the colour of freshly shed blood with which we are all familiar. The colour of the stun depends greatly upon the exposure to light and air that it has under gone. In some cases the efforts of the accused person to get rid of the evidence of his guilt may leave very little trace of the presence of what had been a large blood stan.

On a hard surface such as glass or iron the stain may resemble dark red wax in parts. If it be the blood of a bird that has caused the stain, the waxy appearance is uniform and highly characteristic. On earth or plaster the stain will be dull of surface and dark brown or greyish brown in colour

If the stained fabric be dark in colour the stains may be hard to detect when examined by daylight. In such a cree it is of service to examine the fabric through an eosin film as suggested by Popp or by artificial light candle light being libe most satisfactory. I think the rays being allowed to fall obliquely on the fabric.

Often bamboo staves are sent by the Courts for examina tion as to the origin of suspicious looking stains on them Though the bamboo staff is a very favourite weapon of offence in India yet it is in only a few cases that the stains on it we found with the did not be the 'or 'black. As a wide 'hey are due 'or 'black saliva ejected during the process of betel chewing and mimic the appearance of true blood stains very well indeed, but on further examination of the stain under the microscope their origin is easily enough detected

I would insist upon the rare occurrence of blood stains on bamboo staves although as we all know lacerated wounds of the scalp which at first sight are not unlike cuts made with a sharp instrument are common results of blows delivered by means of a bamboo staff

On the blade of a knife hatchet or sword we may often find that what the police have suspected to be blood stains are really due to rust. On a well kept knife blood stains are rarely to be found in several cases a secrificial knife live been found free from bloodstains aithough it had been in constant ritual use for a long time and had tracery on its blade in the crevices of which blood would easily have collected 1 ad it not been kept scrul ulously clean. The blood on a knife if any be present will generally be found at the junction of the blade with the handle of the knife or—in the case of a pocket knife—in the nick in the blade by which it may be rissed ly the thumb-nail

Examination of stain —In order to le in a position to determine whether a suspected blood stain is redly due to blood we require —(1) a clean sharp lanfe (2) a pair of scissors, (3) some 10 per cent solution of potassium cyunde, (4) some yellow sulphide of ammonium solution 1 (.) a microscope with a lanch a lanch and a lanch a lanch and sharp lanch some modification of Browning a pocket spectroscope with—thus is indispensible—a wave length scale

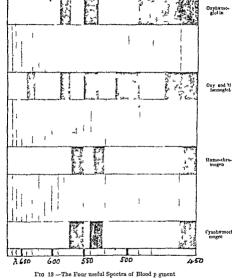
If the stain be on a bind surface a portion of it may be moistened with the potassium cyanide solution seriped off and smetred on a microscopic slide. If it be a soft fabric that is stained a portion at the stain may be surped off instruered in bolling water for it ree seconds to fir the colouring matter by coagulation placed on the microscope shole and treated with a drop or two of the potr-syam cyanide solution the superfluous

fluid being removed at each stage of the process

To the stains thus treated there are then applied a few drops of ammonium sulphid, solution. The preparation is then covered with a cover glass the superfluous fluid is mopped up by a fresh morsel of bibulous paper and the preparation examined under a low power. If blood be present at some spot in the preparation we shall see a cherry red colour. If the coloured part be very small we bring it into focus under a high power and then having remove the eye piece insert into the microscope tube the long tube of the spectroscope. The absorption hand or bands visible in the spectrum may now be fixed as to their position on it is each by the simple device of holding a piece of white paper below the end of the short tube of the spectroscope to illuminate the scale well.

saturate a 1 4 solution of ammon a with hydrogen sulplude and then add an equal volume of ammonta solution, the resultant leng (NH4) HS in solution which must be kept in a stoppered bottle

If blood pigment be present it will have been converted into cyanhaemochromogen, whose spectrum gives a dark band at \$570-550 and a darkish band at \$540-525, the latter



however if the dilution be high may be so faint as to be almost or quite invisible

No other known substance when treated as above described

gives the cherry-red colour and the spectrum of evanhemochromogen Hence the value of this method of examination whose technique has been elaborated by Hankin. The test is a most delicate one and should always be employed. Thus carried out the use of a microspectroscope is obviated, and this is a great advantage, as all who have ever used one will agree If, as sometimes happens, we have a large stain or a quantity of earth available for the test, then it may be simplified by extracting a considerable portion of the stain with physiological salt solution, and adding to the contents of the test-tube a few drops of pyridin, when the brownish liquid will become cherryred, and then a few drops of the ammonium sulphide solution. The contents of the test tube are then examined by the long arm of the spectroscope being held against the tube, and the spectrum of hamochromogen, which is slightly different from that of cyanhymochromogen, will be seen, if blood is present

Were the blood stains quite fresh-a rare event in Indian forensic medical practice -we should find it hard to get rid of the characteristic spectrum of oxyl emoglobin two bands, one at  $\lambda 587-570$  and the other at  $\lambda 550-530$ But in most cases the stains are old enough to yield, on extraction with distilled water or physiological salt solution, the spectrum of oxy- and met-hamoglobin four bands, one at \$640-628 in the red, one at \$587-570, one at \$550-530, and the fourth, which is generally merged in the absorption of the blue rays, at \$510-490 these spectra the figures are given (Fig 13)-special attention being directed to the actual position of the absorption bands in the wave-length scale, for it is their position which is allimportant

In my opinion it is sheer waste of time to attempt to obtain the other spectra of blood. The spectra of acid and alkaline hamatin are the reverse of delicate and I do not know of any case in which it has been necessary to obtain the spectrum of hæmatoporphyrin bere in India, although in a few cases in Europe it has been of use

Teichmann's crystals.-We may obtain in many cases valuable confirmation-or rather corroboration of our spectroscopic findings by treating a fragment of the stain thus -On a clean unicroscope slide a drop of salt solution is caporated Near the spot thus formed is placed a minute fragment of the On to the preparation is dropped a drop of glacial acetic acid The preparation is then covered and warmed in the Bunsen or spirit flame until bubbles appear. It is then laid aside and examined after half an hour. Under the low power of the microscope we shall find a multitude of dark specks, which under the high power will be found to be the various

forms of the crystals of hæmatin chloride. Of these an excellent representation is given in the illustration, which I owe to Major W. H. Dickinson, I M.S. who drew the illustration from a specimen made in actual practice. The slower the generation of the crystals the more numerous will be their ultimate form—the rhombs, and the larger these will be.

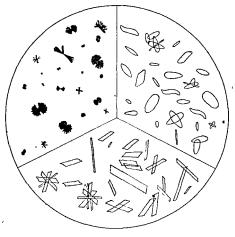


Fig. 14.—Hæmatin Chloride Crystals (Drawn by Major W. H. Dickinson, I. M. S., from a specimen obtained in actual practice.)

The preparation must be only gently heated, and the acid must be glacial But even when these conditions are fulfilled and blood is really present we may fail to obtain the crystals owing to changes having been brought about in the blood by exposure or rust, or both.

V As crystals like those of hæmatin chloride may be obtained

from indigo-dyed fabrics it is well to remember that the crystals of hematin chloride will cause frothing of a drop of hydrogen peroxide whereas the others will not as was first pointe lout by Glaister

Guanac test.—I mention another test not because I use it—my reasons for rejecting it have been detailed elsewhere—but because it was highly panased by Taylor whose monumental work is looked upon with great reverence by the Bir in India and it is lid ely that the medical witness might be asked if he had applied this test which was discovered by van Deen. All who now use it with the sole exception of Mita' do not do more than rely on it as a negative test if they do not obtain the characteristic blue they conclude that blood is not present If they do obtain the blue they do not look upon this fact as irrefregible proof that blood is present.

A good way of performing the test is this—a portion of the stain is moistened with distilled water and then his pressed down on it with gentle rubbing a piece of moist white filter-paper. To the brownish stain sequired by the filter paper are applied (1) a drop of 'freshly prepared straw coloured incture of guanac resun and then (2) a drop of old oil of turpentine, or hydrogen peroxide. Mita states that if he obtains on adding the guanac a cherry red colour which turns to dark blue within half a minute of the ad litton of the oil of turpentine he has satisfactory evidence of the presence of blood. In this opinion he appears as I have said to be in a minority

Since the 1 emochromogen test is so delicate as to be more assert a even as a negative test than the Guana test to perform the 1-tter appears to be a waste of time. If any one doubts this let him try the stains which are known of to be due to blood having, failed to give the spectroscope of cyantremo chromogen and he will find that a large percentage will give the so-called blood reaction on which Taylor relied.

Microscopic examination—Having arrived at the conclusion that the stain before us is really due to blood we proceed to determine whither this has coine from a minimal or a non manimal thus—A minute fragment of the stain is left to sort in two drops of Vibert's fluil—I gramme mercuric chloride and 2 grammes of common salt in 100 cc of distilled water—for I alf an hour. It is then teased out and examined. Under the low power one of the yellowish red masses, due to agglomeration of crythrocytes is brought into the centre of the field. The more or less amorphous defirs and the fibres of

<sup>1</sup> Gross Arcl iv 1909 35 361

the material stuned do not interest us. Under the high power the mass will reveal the crythrocytes of which it is composed and at its periphery the general shape of these can usually be fixed as also the presence or absence of nuclei. Near the edge of the mass may often be found a group of four or five crythroties and with fluck one may find a solitary crythrocyte

If birds or fishs blood be present we shall rarely find the erythrooytes entire. In the great majority of cases all that we shall see will be a mass of granular elliptical nuclei. These must be cirefully examined in order to determine that they are nuclei and not misshapen circular eighthrooytes that have undergone granular degeneration. If we find elliptical crythro cytes with elliptical nuclei the diagnosis of non mammalian blood is very easy but such cases are unfortunately not common.

If normalization blood be present we shall find circular crythrocytes more or less altered in shape and perhaps granular But nuclei will be very rarely present for it is only very few very young mammalian or it rocytes that are nucleated and it is very rarely that one of these is seen amidst the thousands of



Fig 15—Human|Har (By W II Dekloson)

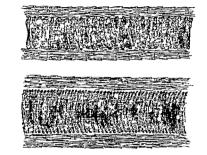
Light brown har from head The da ker the has the grea er the amount of p gment and the less structure agen

non nucleated corpuscles that are found in a single preparation. The erythrocytes of the camel are elliptical and might be mistaken for the nuclei of non mammalian erythrocytes, but here the biochemical test would clear up the difficulty if any

Only practice will enable the observer to come to a decision after examining one or two blood masses under the oil immer ston lens. The beautifully marked differences seen in fresh preparations of mammalian and non mammalian blood are not present in preparations made from old blood stains.

I do not think that one gains much by using a micrometer—stage on eye piece. It is not the size of the crythrocytes seen that matters so much as their general shape and the

presence or absence of nucles. It is quite useless to attempt to determine by means of micrometry, the origin of mammalian orythroxytes. Even in the case of fresh blood the determination is not sufficiently accurate to be of much use in forense medicine. The coefficient of drying of crythroxytes has not vet been nor is it likely to be determined, still less the degree of return to their original size as the result of treatment with any of the various fluids that have been devised for treating preparations of blood stains. Thus we can never be certain that the crythroxytes from a stain have reguined their exict size when fresh neither more nor less. Reference to any table—or



Fro 16.—Cats Hair (By W H Dekinson)

to my monograph.—will show that even in the case of Irab blood the crythrocytes of various species of mammals differ very little from those of man and that this is true only of a verage specimens the individual specimens of any one special may differ more in size from each other than the average speciruous of that species from the average specialism of mother species.

At the end of this chapter I have collected a few cases which illustrate the aid given by the microscope in Indian forensic medicine.

In some cases we shall find hairs in the stain and these

may be of service to us. The determination of the source of a hur is not easy, but Major Dickinson, who has made a special study of hairs has kindly drawn several from nature Micro photography would not have brought out the characteristics of each type so clearly as do these admirable drawings, for which I am deeply indebted to him.

Biochemical tests.—These are of recent growth, but are none the less trustworthy and by them we are enabled to [determine the origin of a blood stain with accuracy

The Precipitin test can always be carried out here in Calcutta in a well equipped laboratory by a skilled observer In order to understand it we must remember that the living organism has the power of manufacturing antibodies for any albuminous material that may be introduced into it antibodies exist in the blood of the animal that has been treated. and the blood or its watery portion-the serum-can be stored for use If we take a dilute solution of the albuminous material in question and to this very carefully add a few drops of the serum of the animal that has been treated with it we shall find a reaction take place at the point of contact of the animal's serum with the albuminous solution there will come into being a cloudy layer This is due to the precipitation of the albuminous particles by the precipitins contained in the treated animal's serum. The reaction will not occur if the serum be added to a solution of an albuminous material other than that with which the animal was treated. In other words, the reaction is a specific one. It is also a very delicate one. for even if the solution of albuminous material be of only one ' part in a thousand it will readily become evident

For forensic medical practice the observer must have at hand the serum of animals—fowls are as good as any—that have been treated each with the blood of one of the domestic animals—dog cat, horse, buffalo pig—and a large quantity of the serum of fowls treated with the blood of man For the question which he will have to answer is Is this stain due to

human blood?

From the domestic animals the blood is obtained by vene section, in the case of man it is most conveniently obtained from the placenta after the umbilitied cord has been cut. The blood is collected with great care, to avoid all chance of contamination, and kept in storrile flashs in which it is allowed to clot. As the clot shrinks the serum exudes, and next day this is decanted and heated to 56° C for half an hour. It is then stored in sterile philas corked and sealed with paraffin which are kept in the freezing chamber until they are neeter in the stream of the stream

The fowl's wing is carefully purified on the inner surface by being swabbed with pledgets of cotton-wool scaled in ether—and then the serum (thawed and brought up to 37° C or a little higher) is injected into the wing yein. The close is

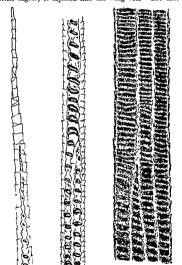


Fig 17 -Rabbit's Hair (By W H Dickluson.)

usually 4 c c On the fourth day a second injection is made, the other wing being used. Fourteen days after the second injection the foul is bled. Its blood is collected as above

described and next day the serum is tested as to its precipi

tating power and specific action thus -

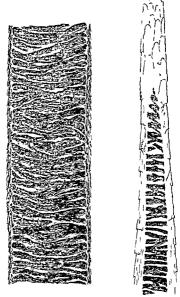
The sera of the domostic animals and of man are diluted a thousandfold with physiological salt solution. In a stand are placed six taper tubes—and into tiese are put the 1 1000 didutions of serum the last tube receiving only salt solution. Then each tube has its contents allowed to run nearly out of it to wet its inner surface well. It is then field in a slinting position and down its side are allowed to run two drops of the treated fowl a serum—which may conveniently be called the antiserum.

Supposing that the fowl had been treated with human serum, then if the antiserum derived from it be specific and highly potent we shall within three minutes observe a marked traction in the tube containing the 1 1000 dilution of human serum but in no other tube will any reaction be visible even after the lapse of twenty minutes. This antiserum is stored for use and every time that it is used for testing blood stains its specificity and high potency are tested again in the way above describe! so that the observer may be sure at the time of testing the blood stains that his antiserum falfils the desiderata of the forense test for sometimes potency and specificity become altered by keeping. The accompanying plate shows the reaction in one tube and its absence in all the others.

The number of treated fowls that yield a good antiserum is fairly large—over 50 per cent. Many are refrictory and many yield a seram that is weak and therefore useless for medico leval work.

When the observer desires to determine the origin of a blood stain he makes an extract of it by soaking the stained febric or scrapings of the stain in physiological salt solution. Some stains are hard to extrict and for these the addition of a few drops of solution of potassium cyanide to the salt solution in which they are immersed is a good plan. The stain extract is then tested as to its alkalinity or acidity. If it be acid it must be rendered neutral or slightly alkaline by the addition of a drop or two of a weak solution of caustic soda or potassium cyanide. If it be strongly alkaline as it will be if the cyanide solution has been used to hasten extraction it must be rendered only slightly alkaline by the addition of a drop or two of a solution of tartaric acid.

The extract having been thus treated is diluted with salt solution until it corresponds to a 1,1090 dilution of serum. The guide is the amount and persistence of the froth formed on gentle shaking. A little practice enables the observer to



I'm 19 —Gumea-pig a Hair (Fr h H Dickinson)

obtain the necessary dilution of the extract with surprising accuracy. The dilution is carried out in order that the test

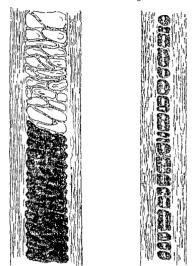
may be as delicate as possible. If anti human serum be added to, say, pure horse serum or a 10 fold dilution thereof we shall have a reaction—the mammalian reaction as Nutrill first called it—but if the horse serum be diluted to 1 500 no such reaction will occur within 20 minutes—and it is still less likely to occur if the dilution be 1 1000

Dilute, water clear 1 extracts of all the stains that have been proved to be due to I lood having been made these are set out in taper tubes To the contents of each tube the observer adds two drops of an anti human serum which he has already tested on the morning of that day and found to be highly potent and specific in reaction When testing it, he has guarded against too rapid thawing which interferes very much with the specificity of reaction for the physical attributes of the serum are obtained in their entirety only by very slow The tubes whose contents show reaction within twenty minutes are noted. The stains whose extracts are in these tubes are proved to be due to human blood Monley's blood has been only once alleged to have caused the stains found on articles examined by me, but as I have shown else where 2 even those apes that are most nearly related to man are sufficiently far removed from man for their blood to be differentiated from his by the 20 minutes time limit of the Other portions of the extracts which have shown no reaction with the anti-human serum are now tested with an anti rummant serum. Should any stain extract still show no reaction, a fresh portion of it is tested with anti-canine antiequine etc serum until the whole gamut of the domestic animals has been gone through Of course should the police have reported that it is suspected that the blood of, say a cat has been smeared on the articles sent for examination the antifeline serum is the first that is used after the anti-human serum I may note that in those cases in which the police had reason to suspect that what was alleged to be human blood had an origin other than human their suspicion was generally found to be well grounded The wiles of those who desire to get their enemies punished or to escape from the consequences of their own acts are many, but the police seem to be quite able to cope with them From the large amount of material that has passed through my hands I am convinced that the work of the police in grave criminal cases is far more honest

<sup>&</sup>lt;sup>1</sup> The extracts will not be quite clear in the case of blood stained earths an in some cases the dilution is much higher than 1 1000 because the quantity of albuminous material in the stain is so minute.

SOTHERLAND The Applicability to Medico legal Practice in India of the Brochemical Tests for the Origin of Blood stains Calcutta 1910 (Scar tiple Memorrs New Series No 39)

than certain of the lower organs of the press here care to admit Why I am so convinced will be clear to all unprejudiced readers of the details of the examination of articles given below



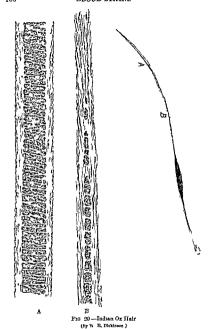
Fro 19 - Dog's Hair Irish Terrier (By W R. 1 ckinson)

If a blood stain has been washed it will usually be impossible to say more than that it is due to mammalian or non mammalian blood. If it has been well washed all that can it be said is that it is due to blood, whose elements are too

disintegrated for its source to be determined Failure to obtain a reaction with the extract of a blood stun may be due to any of the following causes (a) The extract when diluted to the 1 1000 standard may be incapable of reacting with the antiserum, owing to the paucity of albuminous material that is present Such a result may occur in the case of microscopic ally visible stains, but, in my experience, does not occur where the stain is plainly visible to the naked eye, and has not been interfered with by any of the substances noted hereunder (b) The extract, if markedly acid, will not react until it has been rendered nearly neutral (c) If mercuric chloride be present, one part in 10 000 or permanganate of potassium be present in even smaller amount, the reaction will not occur (d) Chloride of lime sulphate of copper sulphate of iron, chloride of zinc and bisulphide of sodium have all an adverse influence on the reaction Fortunately none of these compounds is commonly met with in forensic medical practice here, but the observer must bear in mind that any of them may be present and interfere with the reaction. Naturally, if a stain extract that froths when diluted to 1 1000, and is neutral or slightly alkaline, fails to react with the anti human serum, it is no use asserting that it is thereby ' not proved to be due to human blood or assuming that it is contaminated by any of the above mentioned compounds if it gives a reaction with say, anti ovine serum, showing thereby that the physical characters of its elements have not been interfered with, or vice versu. Putrefaction of the stains does not influence the reaction This is fortunate for sometimes blood soaked garments are so carelessly packed that, before it dries, the blood undergoes a marked change The age of the stain does not matter. I have obtained the characteristic reaction from extracts of stains that had lain in Calcutta for over four years and it is not likely that stains of greater age than this would fall to be examined

Here in India one is frequently called upon to examine carth that has been dug up from the floor of a dwelling, or from a courtyard or a field with a view to ascertain whether the stains on it are due to human blood. Having determined that blood is present, the observer might be at a loss to discover its source owing to the fact that his best endeavours to obtain a clear extract fail miserably. The diluted extract remains turbid on account of the particles of clay or humin that remain in suspension, in spite of repeated filtration and centrifugalization.

With such an extract the test, if carried out in the ordinary way by daylight—by inspection of the contents of the tube



against a black background against the light—reveals nothing the turbidity masks the layer of reaction if it exists. This

difficulty may I find be surmounted by a very easy maneuvre Instead of viewing the tube contents against the light they should be viewed against the black background held nearly atright angles to the light. When so viewed the turbulity of the extract-dilution which was so marked when this was viewed against the light will be found to have disappeared while the layer of reaction if present remains clearly visible

If we add anti got scrum to dilute extracts of stains caused by ox, buffalo goat or sheep bloods all will react in a greater or less degree for the rummants are very closely akin. In order to determine which rummant is the source of the blood in any case we must test scprrite portions of the stain extract with anti gort anti sheep anti ox and anti buffalo sera. The anti serum which gives the createst and most rand reaction will

guide us in such a case

The use of fowls as the source of the various precipitating anti-seria is of great service in India where rabbits which are commonly used in l'urope are hard to obtain. The fowls must be carefully isolated for ten days after purel ase to exclude those infected with pasturella. Here in Calcutta the Chittagong breed of fowls is to be preferred as the birds are much larger than those obtainable in Northern India.

The complement fixation test—Although this test cannot be carried out satisfactorily in general forensis scrological work in India owing to the large amount of time which one has to spend in doing it it ments mention which will be as brief as is consistent with intelligibility. The test is based upon the fact that when an animal receives injections of the washed, erythroot tes of another species its serum in time develops the power of causing the erythrooties of that other species to become rapidly dissolved if they are brought into contact with the serum in a test tube

If we treat a rabbit by means of injections of washed sheep s erythrocytes made into the ear vein and repeated twice at three days intervals its serum if taken on the fourteenth day after the last injection will be found rapidly to dissolve sheeps crythrocytes but not the crythrocytes of other nimials. This treated rabbit s serum contains two elements that are of importance (1) the complement and (2) the antibody for sheeps crythrocytes. These must act in concert in order that the crythrocytes may be dissolved. If the scrum be heated to 56° Gr half an hour its complement is destroyed and the dissolving power is lost. If however to the heated scrum be added some fresh rabbit scrum or fresh guinea pig scrum the complement is restored and the dissolving power returns for

the antibody is not affected by the heat which destroyed the complement

Thus if we put into a test-tube some fresh guinea pig's serum (complement), some heated serum of a treated rabbit (antibody) and some sheeps crythrocytes in suspension in physiological salt solution, the dissolution of the erythrocytes will be speedily brought about, their pigment passing out into the fluid

If we take complement and incubate it for an hour at bloodheat with an extract of a blood-stain, and then add to the contents of the tube the antibody and the sheep s crythrocyte suspension, we shall have dissolution of the crythrocytes as before Rut if we take complement, and the blood-stain extract, and some antiserum for the blood that caused the stain, on incubating these we shall have the antiscrum combining with the albuminous elements of the extract This combination has the property of fixing the complement, so that none is left over to act in concert with the antibody of the treated rabbit's serum when this is added, and consequently when the erythrocytes are added they are not dissolved

Thus we see that if we have incubated together for an hour (1) complement with (2) the extract of a blood stain and (3) some anti-human serum and then on adding (4) some heated scrum of a rabbit that has been treated with sheep a crythrocytes, and (5) a suspension of sheep's erythrocates we obtain dissolution of the erythrocytes, we may be sure that no combination of the albuminous elements of the stain extract with the antihuman serum has taken place In other words, we have proof that the stain is not of human blood. If dissolution of the erythrocytes does not occur, this shows that the complement had become fixed before the antibody was added, is that the anti-human serum had combined with the elements of the stainextract, because these are of human origin

In actual practice the treated rabbit's serum after it has been heated has its power of causing the complete dissolution of 1 cc of a 5 per cent suspension of sheep's erythrocytes in physiological solution estimated the smallest quantity of the serum that is required for this is noted and holds good so long as the supply of that particular rabbit's serum lasts The smallest quantity of the anti human serum-or anti equine, etc , serum-which will cause fixation of the complement in the presence of randou c c of human serum (or equine, etc , serum as the case may be) is determined, and holds good so long as the supply of that particular anti serum lasts. The requisite amount of the complement must be ascertained on the morning of the day when the test is carried out

Altogether a tedious task, which, even after all requisite quantities have been determined, takes at least four hours to perform Another drawback is the fact that many materials which may have blood stains on them have, when extracted, an anti-complementary action This is not removed by boiling, whereas the specific action of the stain extract is destroyed by boiling Therefore two series of tubes are needed series are put boiled, in the other unboiled, extracts of the stained materials, and into all are put the necessary elements of the test, the results obtained in the two series being then compared

Here in India the great difficulty in the way of the observer is the fact that it is exceedingly hard to obtain the very strong anti serum required to cause complement fixation in the presence of the minute amount of albuminous material in the very high dilution of the stain extract that is used in practice The higher the dilution the more delicate the test. because the more specific, and thus the more trustworthy the

results obtained by it

Even were one able to carry out this test here as it is performed in Europe, it would give us only information corroborative, never corrective, of that obtained by the precipitin test And, as already mentioned, it requires so much time that it cannot be carried out satisfactorily in general work. The day having only 24 hours, of which a certain amount must be consumed in sleep, it is never likely to come into general use in India, we think

The anaphylaxis test.—This test I have not yet had occasion to employ, but describe it as it may later be found possible to have recourse to it in those cases in which the results obtained by means of the precipitin test seem to call for corroboration

It is based upon the fact that when an animal-preferably the guiner pig, which is very sensitive-receives an injection into its circulation or under its skin of some foreign albumin it develops extraordinary hypersensitiveness to this albumin. so much so that if the first injection be of 100 cc of sheep's serum, and the second dose be 2000000 cc the body temperature will rise and continue to rise for about an hour, whereas a previously untreated guinea pig requires zlo c c. of sheep's serum in order that its body temperature may rise as shown by Friedberger

The shock caused by larger doses of foreign albumin is much greater in sensitized guinea-pigs. An untreated guineapig's temperature will full if it receives 1 cc of sheep's serum intraperationeally, a guinea pig that has already received 12, ce will show a marked fall of temperature if the second dose be

only tool me cc given intraperitoneally

The hypersensitiveness comes into being only after a certain time has elapsed since the first dose of sensitizing albumin was given Conveniently the fourteenth day may be taken for the second dose in medico legal work, the test being carried out thus -

A series of guinea-pigs-say six-is treated by means of injections of 11 cc of human bovine feline equine etc. serum given intraperitoneally or subcutaneously. On the fourteenth day this series is ready for the test. An extract of the suspected stain is then made with physiological salt solution The guinea pigs body temperature is taken, by a special thermometer being introduced into the rectum and noted. Then each animal receives an intraperitoneal injection of a portion of the stain extract, which has been divided into seven parts The seventh part is given to an untreated guinea pig which acts as a further control

sh

	ow have	supposing that our stain is due	to human blood we
			Eccult
1 2 3 4 5	G I	ensitized with horse serum sheep serum dog serum cat serum pig serum	nıl
Ğ		human serum	body temperature shows marked change
7		not previously treated	nıl

The change in the body temperature will depend on the quantity of human albumin that was given by the second injection If this was but small the temperature will show a rise, if the quantity was large there will be a distinct falL

As will be seen this test is wasteful of guinea pigs, for the first animal of our series will now be hypersensitive to equine and to human albumin the second to ovine and human albumin and so on Still there might arise a case in which the information afforded by the test would be of value

Naturally the question of the identity of the blood in a stain with that of a suspected person is one that has arisen in medico-legal cases Many observers have endeavoured to find

the answer to this question, amongst these are Landsteiner and Richter, and von Dungern and Hirschfeld. They have found that the bloods of all the individuals that they examined fall into four groups, which they call A. B. AB, and O

A—The erythrocytes contain an agglutinable substance  $\Lambda$ , and the serum an isoagglutinin  $\beta$  This class is very numerous

in Central Europe

B—The crythrocytes contain an agglutinable substance B, and the serum an isoagglutinin a This class is comparatively rive in Central Europe

rare in Central Europe

AB—The erythrocytes contain agglutinable substances A

and B, but the serum contains no isongglutinins

O.—The crythrocytes contum no agglutinable substance, but the serum contains isoagglutinis a and  $\beta$ 

Lattes and others call the groups AB, Ba, ABo, aBO

Von Dungern and Hurschfeld found that A is much more common amongst Furopeans than amongst Indians, who have a higher percentage of B than Europeans Negroes and Annamites They go so far as to assume that Northern and Central Europe is the cralle of the A race, while India is that of the B race

The investigation is conveniently carried out by means of hanging drop preparations The erythrocytes to be examined are suspended in isotonic saline solution, and to this a small quantity of the serum, whose properties are being investigated, is added. In practice 1 part of erythrocyte-suspension (12 or 23), and 2 parts of a 12 dilution of serum are employed Care must be taken to distinguish between pseudo agglutination and real agglutination, in which irregular masses of erythrocytes are formed, the cells being piled one on the other and their contours lost So far we have had no occasion to apply this test, whose technique we are practising against the day when it may be required. Here the long distance of most districts from Calcutta may be a serious objection, not only as affecting the suspected individual, but as causing unavoidable delay in examining the blood in the stains, whose elements are subjected to many known and possibly some unknown influences which may affect the results

Magistrates in this country are eager enough to know everything about stains that are in question in cases before them We have been asked to furnish information as to whether the blood in stains had been shed by a woman or a man, whether it had been shed before, during, or after the birth of a child, from what part of the body it had come, what the probable

2 Lancet, 1919, 11 675

<sup>&</sup>lt;sup>1</sup> Zschr f med Beamte, 1903 p 85. <sup>2</sup> Muenchener med Woch, 1910 p 741

age of the person was, also whether a stain had been caused by male or female semen.

Lattes? reports a case in which a man was accused by his wife of having been unfaithful. She had found bloodstains on the front of his shirt and had consulted a clair-tovante, who

had confirmed her suspicions.

The man said the source of the blood might be—

(a) Some beef that he had handled just before he had

micturated
(b) Blood from his wrethra as he had suffered from difficulty

in urination for some time
(c) The shirt might have been handled by a neighbour,

(c) The shirt might have been handled by a neighbour, while she was menstruous

(d) He considered it to be most probable that the blood was his wife s and that she had stained the shirt with it in order to force him to confess

As the stam-extract reacted only with anti-human preciping a sum-extract reacted only with anti-human preciping forms borne blood was excluded and Lattes proceeded to examine the properties of the extract against the erythrocytes of certain persons. He found that it agglutnated the erythrocytes of two persons known to belong to group B and caused no agglutination of those of two persons known to belong to group A.

Then he tested the erythrocytes of the man the wife and the neighbour who was suspected to be the mans paramour. The man and this woman belonged to group A, while the wif, belonged to group O and was therefore excluded as the source of the blood. As there were no against epithelial cells in the stams Lattes was of opinion that the neighbour could be excluded too and that the stams had probably been caused by the man's blood so reace was restored.

trehitto di antrop erun e pied legal. 1916 38 400

Details of Findings as to 23 603 Articles suspicited to be Blood stained Examined in 10 5000 Medico Legal Cases

			Source of blood				
					Mamp alfan		
Articles.	Total	B ood stained,	mam mailan		Identified	Not ident fied	
				Human	Not buman	as to exact source	
Adze	53	26	_	92	8 6 1		
Amulets	2		i —	-	_	I -	
Anal discharge	1,7,1	11 048	46	9761	~ ~ -	1 -	
Apparel wearing	19 144	11 015	4 40	9701	S G 155 Camel 1	-	
	İ	17.	uman s	l 1	O B 57		
	-	1 -	Horse		Dog 1	1	
	-	l	220134	•	S G & H 8	1	
	1				OB&H2 Rat1		
	1				G&H2	1	
Areca nut	1	l		-	_	-	
Arrow	35	99	1 — 1	20	S G 1	) 1	
Ashes	15	7	-	5	_	1	
Awl Axe	915	476	11	37±	S G 17	1 1 14	
vie	313	1 210		3/1	0 B 5	1 **	
			l		B G & H 1		
Bag	14	12	2	10		1 -	
Bamboo	911	496	2	894	0 B 4   8 G 11	2	
Bark	21	12		. 8	5 G 2	1	
Barrel	8	3	l	3	_	1	
Basket	27	22		19	S G 2		
Bayonet	2	1	-	1 21	-	-	
Beads Bedding	28 829	25 591	2	465	S G 1	    3  1	
Belt	1 6	331	ا ئـ ا	4	8 6 1	8	
Bench	1 2	ī		1		-	
Bill hook	555	311	2	108	0 B 3 5 G 2	1	
Blood	29	-	_	21	Dog 1 O B 1	-	
Bone	83	15	l	20	Dog 1	_	
*NATO	00	"	_	_~	0 B 2	-	
Book	4	3		3	S G 6		
Bottle	8	6	1 =	5		1 =	
Bow	i	1 -	ļ —	-	-	_	
Bowl	1 3	1 2	i	1 1	-		
Bracket	] 3	1 2	1 —	1	· –		

., leather

\*\* vegetable \*\*

Dibble

Wire Dagger

Dirt from finger nail Door panel

scabbard

# BLOOD-STAINS.

Source of blood Mammallan ٠

			Non-				
Articles.	Total	Blood- stained	main- mallan		Identifed.	hoi identified	
				Homen	Not human	Sonfce .	
Bradawl	1	1	_	1		1 =	
Bread	2	2	i —	1 2	-		
Brick, tile	119	77	1	69	0 B 1 8 G 2		
Broom	10	6	-	6	2	-	
Bucket	2	1	-	1	) <del>-</del>	1 -	
Buttons	4	1 2 6	=	1 2 6		-	
Can, canister	8	6		6	_	-	
Cane Canvas	) ŝ	1 3		1	-	1	
Cardboard	3	2		3	_		
Cardooard	14	4	_	2	0 B 2	-	
Celluloid, sheet of	1 1	î		1 9 2 2	0.5.2	1	
Cement, plaster	103	69		52	202		
Octional Lineary		- 00			S G 5 O B 1	1	
Chair	1	1	-	1	-	i	
, leg	1	1	_	1	-	-	
rail .	1	1		1	_	-	
Chain	ī	1		1	-	l –	
Chisel	20 391	. 8		7	l <del>-</del>	1	
Chopper straw	381	274	- 1	253	S G 2 O B 1	=	
, meat	10	10	- !	10			
ehell	1	- 1	_	- 1	_	) -	
Cigarettes	8	-	-			-	
Coconut-scraper	2	2	Ξ	2	_		
Coins	19		_	å i			
Cour	3	8		6 2	8 G 1	1 =	
Convict s neck ticket	1 1	ĭ	_	1		۱ -	
Cordage	137	93	~	85	0 B 1	2	
	- 1				S G 3		
Cot	60	51		49	Horse 1 S G 1	i	
Cotton wool	80 22 13	16	- 1	15	8 6 1		
Cowdung	13	10		7		1 =	
Crowber	21	12	=	12	_	_	
Curtain	9	5	- 1	5 .	-~		
Cushion		1	- 1	1	_	-	
Cutter, areca nut	1 3 29 8	8	— J	8	-		
" fish	29	20	1	17	-	i —	
grasa	í 8	1	!	1 1	_		

1 10

8

75

6

5

ов1

S G 3 O B 1

8 1 10

1 12

3

6614

91

			İ		Source of blood	
			_			
Articles	Total	Blood stained	Non mam malian		Identified	Not identified
				Homan	Not human	as to exact source
Door frame Earth	°503	1757 H	30 uman a	1481 1481	O B 20 O B & H 1 S C 58 Cat 2 Dog 1 Pig 1	21
Envelope Fan Fæces of tiger (sup posed)	1 2 1		Ξ	_2 _2		Ξ
Farm implements Feather	43	20 8	1	17 1	O B 2	_
Fibre alos File Flesh	3 3	_	uman a	_	 O B 4	=
Flesh cooked Fluid Flour Fork Fruit Game board Glass pane Glove Gound Grain not adherent to weapon	8 12 1 1 2 1 8 8 1 2 2 2 83	1 1 1 6 6 1 1 2 53	uman i	1 1 5 1 - 2 70	Horse 8 Goat 1 O B 1 S G 1  Horse hair 1 Insect 2 Cat 1	
Hair pin tuft of Hindu Halbert Hammer mallet Harness Hat turban cap	1 2 25 26 11 518	2 16 19 5 885	=	2 10 15 4 351	Vegetable fibre 1  S G 2  O B 1  S G 2  O B 2	= = = = = = = = = = = = = = = = = = = =
Haversack Hinge Holdall Hook Hitsk Iron bar fragment hook Idol pole used as	2 1 6 2 2 1 16 2 2 1	10		- 1 5 1 - - 9 1 -	0 B 2	1

					Source of blood	
		1			Mammallan	
Articles	Total	Blood stained.	matn mallan		Identified	Tot identified
				Heman	Yet human	so to exact
Jewellery Juto Key Key Kitchen utensils Kmile sheath sacrificial huka sheath Lacquer box Ladder Lamp lantern stand Latch wooden Leather	291 25 19 581 18 21 21 27 1	200 13 13 491 11 3 11 2 1 1 1 4	7 - 1 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1	195 1 3 11 506 10 8 1 1 1	S G 13 O B 8	1
Leaves	216	191	2	167	S G 2	-
Letter Lime Lint Match box Material from stame I body of accused	1 1 2 2 5	1 2 2 5	maban	1 2 2 2 5		111111
Mattings carpet Micro-slide Mill hand Money order acknow	259 1 1	201  1 1	16	178	S G G  -	8
lodgement Nat parings Nat prion Nat prion Nat prion Nat prion Nat prion Nat prion Nat prion Nat prion Nat prion Curruncy notes	159 1 4 4 1 2 36 4 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	11 1 1 1 1 2 2 2 3 1 1 5 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		14 1 1 1 26 2 2 1 1 2 1 1 1 1 1 1 1 1 1 1	OB 1	3 11 11 11 11 11 11 11 11 11 11 11 11 11

Source of blood.

				-		Mammalian	
Articles	Total. Blood mam main			Not identified as to exact			
					Homan	Not human	source
Playing cards Plough Folio and Folio	for	6 1 1 61 18 10 3 3 3 1 87 1	20 - 1 - 3 1 - 59 - 1		6 1 2 1 41 17 1 3 3 3 5 1 5 2 1 4 4 4 6	9 G 1 8 G 1 	
Roller Sacking		1 147	1 125	-	1 114	O B 1 S G 1	
Sail beat Saira Saira Saira Saira Saira Security	ac	1 2 43 7 7 1 5 1 1 1 1 3 2 1 1 5 0 1 1 3 3 5 1 1 1 4 7	2 1 3 1 3 - 1 86 - 131 3 1 90		1 90 2 1 8 1 1 90 90 90 90 90 90 90 90 90 90 90 90 90	Goat 1	
Spear fish Spectacles Specon Staple Sticks bludgeons Stones		78 5	51	1 2 5	1 1 1 195 567 n also	S G 9 O B & H 2 O B 9 S G 12	- - - - 1 5

			fource of blood.				
		_			Manimal an		
nsisity A	(otal	Bi vod stained	Non- mam malian		Identified.	id pille	
				Haman	Vot buman	#00000	
Stones granding roller Straw grass	2 1 165	2 1 147	10	2 1 115	5 G G O B 2 Pig 1	- 1	
Sugar cane Sweetmeat Sword	7 801	212	=	217	B C 2	= = = = = = = = = = = = = = = = = = = =	
İ		l	maliar	also 2	ì		
belt belt belt belt belt belt belt belt	1 42 5 1 1 4 4 1 2 4 4 1 2 2 5 5 2 2 5 3 5 3	1 19 1 1 1 3 8 8 1 1 1 3 4 1 5 5 1 2 2 1 2 6 6 2 3 1 2 2 4 6	111111111111111111111111111111111111111	11 11 12 13 14 15 11 15 11 15 11 15 11 11 11 11 11 11	S G 2 O B I	1	
Tyre Umbrella sunshade cover Vaginal discharge	18 18 19	1 8 1 4	===	1 8 1 4 1 semen			
Washings of clothes of handsand feet	6 11	3	=	1 semen 1 2	=	=	
Waterproof Wax cloth Sealing Voight Wheel Whip Winnowing beket Wire fencing	1 1 2 2 2 3	1 1 1 1 9 9 9 9 9	111111	- 1			

			Source of blood				
		1 1		Mammallaq.			
Articles.	Total,	Blood	Non melian		Identified	Not identified	
				Human	Not human	as to exact source.	
Wire, fragments from exploded bomb	3	1	-	1	_	-	
Wood, billets, planks	591	872	12	322	OB5 SG8 Goat 1	2	
Wrench	1	1	ł	1	-		
Yoke of ox cart	8	8		3	_	-	
Undetermined sub- stance	24	16	2	7	8 6 1	-	
Grand total	28 693	20,147	149	17 492	S G 351 O B 138	224	
	í	Human also 8			Camel 1	l	
		Horse also 1 Mammalian also 5			Dog 4 S G & H 9	1	
		Man	malian	also o	OBAHS	1	
					Horse 4		
		ļ			Rat 1 Cat 4	1	
		1			Pig 2		
		1			Goat S		
		ĺ			Horse hair 1 Insect hair 2	ì	
		ļ			Vegetable fibre 1	1	

Letters	s	G	stand for Sheep or Goat
	0	В	" Ox or Buffalb

" G & H , Goat and Human. " S G & H Sheep or Goat and Human

, O B. & H , Ox or Buffalo and Human.

, Mam , Mammalian,

#### Illustratue Cases

1 From Murbuhabad were sent some earth and paddy (unbulsed rice) which were suspected to be blood stamed. The accused person, to whom the paddy belonged, stated that if it and the earth were stained with blood this must have come from a fowl which he had killed at a place where the paddy was stored, the earth being from the floor of that place. The spectroscope revealed the presence of blood in the earth and on the paddy grains. In the earth only elliptical erythrocyte nuclei were found, but on the paddy grains of the internal erythrocytes and elliptical erythrocyte nuclei were present. One of the grains had both on it, and, curnosily enough both were present one of the grains had both on it, and, curnosily enough both were present. One of the grain was tande. Turther examination showed that the namination blood present was entired to the properties of the present of the panel was tande.

2 In a case of dacoity—gang nobbery—from Singhbhum were sent portions of a shurt and a lone-leath, which their owner had stated implify well be blood stained, as on the night before the dacoity occurred he had billed a sheep, and on the might after it he had killed a for 30 Hood was present on both garments, but no elliptical erythrocytes nor their noclei were found, so that it was not foul a blood that had caused the stains. The mammalian corpuscles which were present were found to be of human and not ruminant orus, and thus the erythantschan given by the human and not ruminant orus, and thus the erythantschan given by the

accused person was proved to be a pure invention

5 Trom Dacca in a murder case were sent four specimens of earth and a bamboo that were suspected to be stauned with blood. On the bamboo end two of the specimens of earth—one of which had a human haur on ti—no blood was found. In one of the remaining specimens of earth were found elliptical crythrocyte nuclei. This earth was from a spot which the owner of the house, from which is was taken, said had been stained with pigeon's blood. The other specimen showed mam malian crythrocytes but these were not proved on further examination to be of human origin. At least the story about the pigeon's blood was probably true.

4. In a murder case from Dramond Harbour there was sent the loincled in a man who had been seen in the company of the murdered woman shortly before her death. He admitted that the cloth was blood stained, and explaned that this was due to his having killed a duck some time before. Examination showed that in the stains there were present

only elliptical crythrocyte nucles, and thus his story was corroborated 5 in Jhelma man accused another of attempted number, alleging that he had shot him with a revolver, at a spot where the ground was found to be staned with what appeared to be blood, and was, according to the complainant, the blood shed by him at the time Oral evidence of the sittle, was also forthcoming The police, who doubted the trull of the charge, sent the earth for examination. It was found to be stained with non mannalian blood alone, and the case was dismissed as false

6. Trum Diministration consequences and the trace was which a woman alleged to be stuned with her blad, and the which a such that woman alleged to be stuned with her blad, and the stune and product The status are found to be due to non-mammalian blood alone—and no screen was found on the old. However, the Magnetach dought that the case was tree But he also found that sufficient evidence was not forthcoming against the two men whom the woman had accused of having committed rape.

Some aweetment, which was supposed to have been mixed with menetrual blood, in order that it might act as a love-philtre, was sent for examination by the man who believed that his affections were being played upon in this manner. There was no blood present in the sweetnest,

which consisted of ghi and sugar

8 A man alleged that he had been cut down with a bill hook by dacotts and that the blood shed by him had stained some straw, which was sent for examination. The straw was found to have only non-mammalan blood stains, and the case was dismissed as false by the Court

9 A girl said that she had been ravished by three men, and that each of them had had intercourse with her, with profuse ejaculation, while she was held down by the other two Her Ion-cloth was stained with blood, but not with semen The blood was non-mammalian, so the charge of

rape was not pressed

10 Some earth that had been taken from near the spot where a corpse had been found was sent for examination. The defence was that if blood was present in the carth it must be that of a fow. There was only

non mammalian blood present in the earth

11 A man was caught in flagrante delicto with a culf. He explained that the charge was false, being concected by the husband of his mistress, who had detected the intrigue but did not wish to bring discredit on himself. His trousers were found to be bloodstained and he alleged that the blood was due to his mistress having been menstrous at the time of their last meeting. However, although according to his account the liason had lasted for some time, he was unable to give the woman's name On the trousers were found stains which were due to human blood and to the blood of an ox or buffeld. He was found guilty

12 A man was accused of having stolen and killed a gost. When his house was reached a blood stained rag was found lying in a comer. On being questioned about the stains on the rag he explained that they were due to its having been used as a diaper by his daughter, who was then menstraining. Mammalain crythrocytes were found, but further examination showed that these were not human, but of a sheep or a goat—most probably the latter. The man s story was thus proved to be

absolutely false

18 From Dinajpur in a murder case were sent two specimens of earth and seven pieces of hamboo. The owner of the house from whose yard and verandah the earth had come, and in whose room the bamboos were found, explained that if there were blood found on the articles it was probably that of an eel Careful examination failed to detect maximalian erythrocytes, but large elliptical erythrocytes and their nuclei were present in great numbers in the stains on the pieces of bamboo. In the specimens of earth blood was present, but no crythrocytes could be found. Further examination showed that none of these articles had been contaminated with human blood. The truth of the explanation given was thus established.

14 From Purnea was sent a bunch of jute-plants which were sus pected to be stuned with blood of an ox, the case being one under section 429 IPC Human blood was totally excluded by the results of the examination, which showed further that the blood on the plants

was due to buffalo s or ox s blood

15 The police of Purnea sent for examination two sickles, some earth, and a bamboo, which were suspected to have blood stains on them The origin of the blood was held to be doubtful. I was asked whether, if any were found present, it had come from a human being or a fowl. On one of the sickles no blood was present. On the other articles there was blood, which showed many elliptical crythrocytes with nuclear bridges circular crythrocytes. The stain extracts did not react with crith-payers?

serum. Obviously the police had in this case good grounds for their donbts

16 From Madras were sent scrapings of a blood stain on the plaster of the wall of a cow-house, in which a man was alleged to have been murdered I found that the stain was due to the blood of a ruminant and not to that of man. Further investigation, carried out at the suggestion of the Chemical Examiner, Madras, showed conclusively that human blood smeared on the plaster was easily identified as human blood -te the plaster itself was not contaminated by reason of its site, so as to mask the reaction for human blood, and thus lead the observer into

17 The loin-cloth of a man who was accused of having committed murder was found to be stained with what looked like blood. He said that if it were really blood it must have come from bugs or other blood sucking insects which he had found on the cloth and crushed. The stains were found to be due to human blood, but not to contain any vertiges of insect structure. When the case came to be tried he changed his story and stated that the loss cloth was stained with the blood of his son, who had been kept standing in the sunlight until his nose bled, by the police who had tried to force him to bear false witness against his father. The Court found that both stones were false, but was compelled to quit the man for lack of sufficient proof of his guilt,

18 In a riot case there was sent some earth which was alleged to be stained with human blood. The place from which it was taken had been. pointed out to the police as the scene of the riot, so that suspicion might be removed from the actual aggressors The earth was stained with the blood of an ox or buffalo alone The fact was that those interested had slaughtered the animal at that spot, with the intention of misleading the police

19 A quilt and a towel were sent for examination in a murder case The defence was that if these articles were blood stained the blood Lad come from sores on the body of one of the persons accused. The quilt was found to be stained with human blood. The towel, which had been care fully washed was found to be stained with mammalian blood, whose source could not be accurately determined. As no trace of pus cells was found on either article the story told by the counsel for the defence was not corroborated by the findings in the laboratory The chief actors in this murder were sentenced to death.

20 On a loin-cloth were found spermatozoa, which were obviously not human but resembled those of a dog. At some distance from the seminal stain there was a blood stun which was found to be due to the blood of a dog Some time afterwards the owner of the loin cloth produced another cloth on which were stains due to human semen and human blood. In our of mon he had produced with some effort an ejaculation while he was wearing the garment, in order to prove his innocence and our ignorance with regard to the first carment sent for examination

21 A man was dragged out of his house and murdered in the street. One of his assailants was found to have bloodstains on his clothes. These stains were, he asserted due to the blood of a bullock, which he had slaughtered, but we found that they were due to human blood alone The Jirga, to which the case was referred, found him guilty

22 A man, who was suspected to have committed a murder, stated that if any blood were found on his clothes it must have come from one of his camels. The clothes were stained with blood, which showed only circular erythrocytes, and was found to be of human origin alone

23 The clothes of a man who was arrested on a charge of having committed a murder were stained with blood, which he stated was that of a cow recently slaughtered by him. This was only part of the truth, however the stains were found to be due to the blood of an ox or buffalo, and to human blood.

24 The police suspected that if any blood were present on some earth which was sent for examination, it was that of a youth that had been murdered by a man who used to have homosexual relations with him, but had been provoked by finding him copulating with his sister. The family of the accused person admitted that he and the youth had been on these very intimate terms, but alleged that the blood, if any was found in the earth was that of a cow The earth was found to be stained with the blood of an ox or buffalo alone. The person accused was discharged

25 A body was found and as the death had been caused by violence, the police were only too ready to believe the story which was told by A, to the effect that B had confessed to him that he had done the deed with an axe In B s house was found an axe whose blade was thickly smeared with blood B admitted that he was the owner of the axe, but professed entire ignorance of how it came to be lying where it was found, and to be blood stained On the blade was found a hair which had come from the ear of a black goat and the blood present was found to be of a sheep or goat alone B was released from custody A, who had tried to fix a false charge of murder on him is still a free man

26 A fad of twenty was accused of having rayished a girl of eight No seminal stains were found on her garments and the blood with which they were stamed were found to be that of sheep or goat alone The Judge admitted that this fact cast grave doubts on the other evidence, but convicted the lad and sentenced him to three years rigorous im prisonment and a fine of ten rupees, or-in default-two months'

ngorous imprisonment!

27. For examination was sent some earth which was dug up from the alleged site of a rape committed by a boy of 14 on a very young girl An eye witness testified to the rape, and the medical evidence showed that the girl had sustained injuries on her genitals, but the earth was found to be stained only with the blood of a sheep or goat, probably the

latter The boy received 15 stripes for indecent conduct

, 28 The body-cloth of the alleged victim of a rape was found to be stained with non mammalian and mammalian blood, which was certainly not of human origin The Magistrate discharged the person accused, remarking that the medical evidence makes it almost certain that the girl was raped, but the Chemical Examiner's report throws some doubt on at "

29 In a not case was sent for examination some earth, which was alleged to be stained with the blood of a man who had been speared while defending his crops. The earth was found to be stained with the blood of a dog alone The pleader for the alleged defenders of their crops had to admit that the evidence about the blood being human had been fabricated, and explained that his clients had been driven to concoct it by their fear that one of the chief witnesses in their favour would not support their case The chief actors in this riot were sentenced to seven years' rigorous imprisonment, the counter charge, brought by them as innocent defenders of their rights being dismissed as false

30 In an assault case were sent two specimens of earth. The complainant had pointed out the place where he had been beaten, and the earth of this place was dug up On the next day the alleged assailants pointed out a spot in another field, which they said was stained with blood As no blood had been seen there on the previous day, the investi gating police officer suspected that the blood was that of a goast that had been slaughtered overmight, in order to lead him astray. The earth from the first field was found to be starned with bowns blood alone, that from the second field was stained with bowns and barcine blood. The persons accused of the assault were convicted

31 It was suspected that a murder had been committed at a certain spot A, where the ground was stained with what appeared to be blood The family of the person accused pointed out another spot II as the scene of the struggle. The earth from A was found to be stained with human blood the earth taken from two places at II was found to be stained with

bird's blood alone

32. In a murder case a loin-cloth and a coat were sent for examination The owner of the loin cloth stated that it was stained with the ruice of the fruit of Phyllanthus emblica. When he learned that the stains had been found to be due to human blood, he remembered that on a certain Monday his nose had bled. However, on the Sunday preceding that Monday it had been duly recorded that his loin cloth was stained—the number of the stains being then noted. Of course his pleader made an attempt to escape by asking the Court to question the man as to whether his nose had ever bled before. When questioned he promptly answered that it used to bleed once a month. The owner of the cost explained that the stains on its front-three-were due to the blood of a waterfowl, which one of his friends had shot about a month before the date of the murder Two of these stams were due to human blood alone, th third was due to the blood of a mammal, whose species could not be determined. On the back of the neck of the cost was found a stain due to the blood of an ox or a buffalo. One of this man a cows had been gores by another, and he had dressed its nounds. It is probable that, while bending down to do this, he had got the blood on his coat-collar The owner of the lom cloth and the owner of the coat were transported for

33 A man complained that he had been beaten, and pointed out the place where in blood had been shed. The police suspected that the earth was stained with dogs blood. It was found to be stained with blood, which had become foo disnitegrated for an opinion as to it source to be formed. The parson accused stated that there had been as assaulb but that the complianant had committed it, having stacked hur in his own house. As a proof of this story he pointed out come stains on the floor of a room in his lipies. The earth forming this floor was found

to be entirely free from blood

84 One torry was asked per per an account of his morements during at the period immediately properties of the finding of the correspond on all dworperiod immediately properties, which he made no mention of one Nazilla Nazilla on heigh personal to the district the had seen (asyra following 1,0 worsan on a certain morning—5 days personal to the visit of the questigating police officer. When Gayra leard thus story he promptly accileted that on the morning in question he had watched Nazilla and the other time whom he name, following the woman. The epot from which he said he had seen them was held to be too far away for him to 1 tentify any one, who was walking where he said those men were observed. Later he told how he had seen that the others kill the woman has seen the touches kills the woman has seen the controllers with the others kill the woman has seen the controllers with the others kill the woman has seen the controllers with the said those of the controllers with the woman has seen the controllers with the woman has seen the controllers with the woman has seen the controllers with the woman has seen the controllers with the woman has seen the controllers with the woman has seen the controllers with the woman has been the word to the woman that the woman has seen the controllers with the woman had the controllers with the blood of sheep or goat alone. Nazilla and the others were discharged.

85 Two castes in a Madras village had quarrelled The Nadars

determined to start a not, in which a Nadar should be killed, and then report that he had been killed by the Naucker while he was ongaged in worshipping the goldes. One Nadar proposed that his wife, when he suspected of indielity, should be the vietim. Another proposed that his wife, who had left his protection, was a fit person to be sacrificed for the good of the caste. A third pointed out that his mistress was childless and had no relatives to average her death, so she was beaten to death, after a telegram had been sent from the nearest Telegraph Office to the district authorities about her having been murdered at the temple by the Nackers. In order to prove this story to be true, the Nadars slaughtered a sheep in front of the temple. When the police managed to get sufficient evidence to warrant the arrest of certain men, one of these was tound to have blood stains on his loin-cloth. These were found to be due to human and ovine blood.

36 There was sent for examination a kinfe which was suspected to have been used in a murder. It was found to be stained with the blood of an ox or buffalo alone. The owner of the kinfe stated that he had recently cut un buffalo fiesh with it. The persons accused of the murder

were discharged

The areas and the control of the con

88 A man complained that his father and brother had been beaten by certain men while asleep in his house. The police discovered that a fight had occurred in the roulway and not in the house, the house having been chosen as its scene in order to add to the assault a charge of housebreaking. The soil of the roulway was found to be stained with

human blood

89 Three men were accused of having committed culpable homicalls in the case an important point was the scene of the killing, which the prosecution suspected to have taken place at the victim's threshing floor, but the defence alleged to have occurred on the river bank, where they showed a blood stained place to the investigating police officer. The earth of this place was found to be stained with the blood of a sheep or goat alone. However, the stories told by the witnesses for the prosecu tion differed much from each other, so the three men were divelugated.

40 In Sylhet a man swore that he had had has head cut open by a lath blow, and lost a lot of blood which had scaked into the cloth that he was wearing at the time. The Medical evidence showed that the wound was caved by a sharp instrument and not a blunt one, such as a latin. The cloth was stained with non-mammalan blood alone. The man was tried on the charge of fabricating false evidence and sentenced.

to two years rigorous imprisonment

41 A man stabled his wife and her lover, who died a few days after wards He fled, but was caught and explained that if the stains on his clother were due to blood, it was that of a cow The garments were found to be stained with human blood alone He was sentenced to five years regrous impresonment

42 Three men were accused of having nurdered a man. A owned a field in which a spot was stained with what turned out to be human blood. The earth of a field belonging to B was also stained with human

blood The Khalka, patka, and pyjamas of C were found to be stained. He explained that the stains on the khalka were due to snuff—they were tound to be due to human blood. The stains on the patka and pyjamas he said were due to rust. The patka was stained with human blood; the pyjamas had been well washed, but we were able to report that they were stained with the blood of a mammal, whose species could not be determined.

48 A man reported that his master had been killed while sleening at the threshing floor. He was found to have stains, which seemed to be due to blood, on his clothing, and cuts on the palmar surface of the fingers of his right hand He pointed out to the investigating police officer where the grass-chopper, with which the deed was done, was lying in the house of the deceased. He confessed his guilt to a Denuty Magistrate, who noted that he had taken care to ascertain that the confession was made voluntarily, and explained that it would not lead to the man s discharge, also that he had ordered the prisoner s handcuffs to be removed, and had kept him for half an hour in Court-whence all nolicemen had been excluded-before recording the confession On the fourth day after the murder was committed the cuts on the man's fingers were found to be three or four days old by the Assistant Surgeon. who examined them The handle of the chopper was tightly wedged into the ring of the hand by means of a rag, on which the Chemical Examiner found blood-stains When tried before another Vacistrate he said that any blood that was found on the chopper was that of a pigeon which his master had killed with it, and that he had confessed because the police had told hun that he would get off scot free if he did so At the bessions trial be stated that there must have been a snake or a scornion concealed in the grass that he had been chopping, and that its blood had stained the chopper. We found that the ray was stained with human blood alone

He also stated that he had neter made a confession, but that the Deputy Magistrate had taken down a statement that was dictated by the two constables who took hum to Court. As to the murder, his story was that it had been done while he was asleep, but he had seen three men bearing lathis run away from the spot, being awakened by the nove made by his master. As the night was dark be could not identify the

men (it was the second night of full moon) The assessors found him

not guilty, but the Judge sentenced hum to death

44. In a murder case it was suspected that a bilhook had been used
to inflict the unjuries. The owner of the billhook and his mother stated
that they used it to cut beef some four days before the date of the
murder, and to cut up a fowly on the day following the murder. On the

blade were found stains of the blood of an ox or buffale alone.

45 A man was accused of having committed house trespass by might On the floor of one of the rooms, and on the floor of the verandah, the investigating police officer found what looked like blood stains. The owner of the house stated that these had been caused by the blood stain by the accused person, whom his wrife had struck with a fullhook. The accused person dende this, and said that he believed that the blood as that of the committee of the

40 From Jaclum were sent a kurta and a chadar for emmination as to the stams on them. They belonged to one Karm, who was accused by one Bakhash of having kalled the son of the latter. The boy's body had been found with the threat cut in a mosque, and at the autopsy it was discovered that death was in all probability due to his having been strangled before the murry to the threat was inflicted. Karm stated that the stams on his clothes were due to the blood of a sheep which he had slaughtered It was found that the stams were due to the blood of

a sheep or goat alone Karım was discharged

47. À youth of 19 was caught in flagrante dehete with a young heifer on his ion cloth were bloodstains. These were found to be due to human blood and the blood of an or or buffale, and the earth of the site of the intercourse was found to be similarly stained. The youth con fessed before a Magistrate but after spending a few days in the under trial prisoners' ward he as is usual, retracted his confession, which he said had been extracted from him by threats. He was sentenced to 44 months rigorous impronoment in consideration of his youth, and the fact that in Ahmediangur bestiality is a very common occurrence, the animal generally used being a she ass. The Vagistrate was inclined to believe that the offence in this case was brought to notice because the animal sent a heier and a young one.

48 At Hinwara in Prome District a bullock disappeared from the graing grounds. Two men svid that they had seen a man leading it away but could not identify him. Four days afterwards various houses in a neighbouring village were searched, and in one there was found some dired flesh that looked like beef but was and to be the flesh of a pony that had recently died. Two tins full of this much decomposed flesh were sent for examination and it was found to be horse-flesh aligne.

The charge of theft of a bullock was dropped

49 From Nawabshah in Sind a bloodstained cloth was sent for examination to the Chemical Analyser Karachi. It was alleged that a lad had been wearing it when he was knocked down by two men of whom one then committed sodomy with him Numerous witnesses came forward and testified to his having suffered much laceration of the ansu and it was alleged that he had bled long and freely also that there were seminal stains on the cloth. Two witnesses deposed as to their having been attracted to the spot by the lad a cree, and as to their having caught one of the accused in figure 1 the country of the country o

50 From Mianwali was sent a waistcloth which was said to be stained with the blood that had come from a woman's nose when it was cut by the accused person. He alleged that the blood was that of a cock that he had killed. The cloth was found to be stained with both

non mammalian and human blood

51 An oil seller named Dila reported to the police that on the previous day he had found in his field two boys who had cut a lot of paddy and were going to remove it when he came upon them He took the padd, away from them, so they called three men to help them set upon him and Gobind who had come to his aid and a free fight took place When the case came to trial the alleged paddy thieves and their friends explained that the case was a false one and was due to their having had a quarrel with Dila regarding the boundary between their fields and his. In his report Dila has stated that the paddy had been cut at the north east corner of his land where he pointed out the stubble to the investigating police officer but in Court he said that the stubble was on the south west corner, which abutted on the lands of his assailants He had a small cut on his forehead and from this he said a large quantity of blood had flowed and stained the earth at the scene of This earth was sent for examination, and was found to be stained with the blood of an ox or buffale alone. He had no blood on his clothes in spite of the alleged copious hamorrhage. The Magistrate

in his finding remarked that he had no doubt about Dila's story being a concected one, but as there was "unfortunately not sufficient evidence" to bring this home to him and "no reasonable chance of his conviction, he refrained from sauctioning his prosecution for fabricating false sudence

52 hanna pediar, who used to sell grocernes in the rillages, had a pack bullock to earry his wares. This hullock one night returned home alone and was found to have lost the bell that used to hang from its neck. Next day the corpse of its master was found in the fields of a adjoining village. As there were marks of violence on the folds of an adjoining village. As there were marks of violence on the folds of the choice arrested the only, supposess character." of the village, who denied all knowledge of the matter. He explained that the bloodstans on his eights were those of a black back that he had reconfly kulled, he being a shikar. The clottes were sent for examination, and it was found to the was discharged as it was held that the finding of the bell points was not a fact, but that he had been induced to 'find it by the investigat ung police officer."

53 A man who, as the Magistrate noted, was between 60 and 70 years of age with his body covered with wrinkles was alleged to have taken two girls aged 14 and 11 behind a bush and there ravished the younger of them who was his mece, all the while keeping the eller by his sile At first this little girl complained of a simple assault but later began a story of rape. It was alleged that two witnesses stoned the ravisher who retaliated after he had committed the rape. Other villagers came to the scene and when they departed left the gurls to take care of themselves When the little girl reached the village she informed the grandmother of her companion, and next morning she was said to have pain in the genitals and to have found blood on her san Another story was that she had seen the blood on the san immediately after the rape but had not mentioned it to the eye witnesses of the act. Medical ex amunation revealed runture of the hymen with some inflammation of the No semen was found on the clothes worn by the ravisher and gurl but on the latter were found stains of the blood of a sheep or goat alone The old man was discharged by the Magistrate, who held that the accusation of rape was false and had been brought because there had been several quarrels between him and the parents of the girl

54 The cloth worn by a little girl was sent for examination as it was supposed to be stanged with the blood that had flowed from her vulva, as the result of her having been ravished Her story was that the accused man was drunk and had seized her and dragged her into a walled enclosure where I e had ravished her by holding her down so that her legs were on his shoullers while he effected penetration She produced two witnesses who she said had been urmating in the enclosure at the time, and one of whom had beaten her ravisher with a shoe to make him desist these witnesses, however, one said that all that he knew was that he saw the garl leave the enclosure followed by the accused person who was drunk that the girl who was weeping said that the man had caught hold of her, and that for thus frightening her he gave the man a beating. The other witness denied all knowledge of the affair The stains on the cloth were found to be due to the blood of an ox or buffalo alone The alleged ravisher was discharged, as the Magistrate held that the case had been got up by the girl's parents, who had stained her cloth merely to ex aggerate matters because she hal been termined by the drunken man

55 On 8th October a humbar girl, aged about 14 accompanied by her little brother, was grazing the family a donkeys outside the village A young backetor was said to have seized her by the hanl, and in the words of the judge, "dragged her into an isolated solitude which was covered with bushes and hedges Here he is alleged to have thrown her down and satisfied his last in the most brutal manner. She is stated to have bled freely, and after the young man had left her, to have gone home crying bitterly, to find that her little brother, who had run away when she was being so brutally treated had already told his grandmother what had occurred The grandmother is then said to have told the girl's father, who went to report the matter to the village watchman On the way, they met the grandmother carrying the girl (aged about 14) in her arms It was alleged that at that time the girl's lehnga and her legs were "wet with bloo! ' The grandmother washed the girl's vulva and fomented it The matter was duly reported at a thana 12 miles away, and a constable was sent to arrest the young man who is alleged to have gone to seek shelter from some zamindars and obtain pardon. The Civil Surgeon reported that ' the hymen had been torn some months before, and that there were marks of scratches on the back of the girl, which he thought had probably been caused by nails The girl s "lehnga" was examined by us, and on it were found stains of semen and non mammalian blood, no trace of human blood being present. The judge commented on this finding as follows ---

"The presence of semen on the skirt of the ravished girl is an evidence of the very clearest type that some one had saxual intercourse with her in an agitated and confused manner. As for the blood which has been reported to be non manimalian the conclusion drawn by the expert is monosistent with the very strong evidence for the prosecution. The fact that semen was found on the girls leftang by the Serologist side by side with the blood materially supports the case for the prosecution. The girl gave her evidence in a very simple honest and unprittending manner,

and I was very much impressed by her innocent demeanour

"The accused pleads that he had driven away the girl's donkeys from his Juar field that very day This annoyed the kumbars, who falsely charged him with the said crime. The accused gave no evidence to support his allegation, which is obviously too trivial The girl is still unmarried, and it does not stand to reason that the parents could have degraded themselves so much as to proclaim their daughter s dishonour in such a bad manner. The imputation of rape is the worse kind of allegation against an unmarried girl's character, and it is inconceivable that a father would under any circumstances care to disgrace his daughter so openly in order to avenge himself for such a petty matter as the one asserted but not proved by the accused In my opinion the offence of rape is quite proved against the accused. Both the assessors have found the accused not guilty but have given no reasons for disbelieving the cogent and convincing allegations of the ravished girl Bhagirthi and her brother Haria Their verdict is altogether perverse and contrary to the positive and reliable evidence for the prosecution. In my opinion, the case is a perfectly true one Disagreeing with both the assessors, I convict the accused of the offence of rape, and in view of his young age sentence him to eighteen months RI'

But the case is by no means so simple as the learned judge thought it was. The question of the presence of non imamialian blood instead of mammalian on the girl's lelings is not one of opinion merely, but of hard fact. Apart from this, the absence of any trace of human blood on the garment is, as the judge said "inconsistent with the very strong evidence for the prosecution", just as inconsistent, indeed as is the evidence of the Cyrll Surgeon who found that the girl's hymen had been torn "some months before," although, according to the evidence for the prosecution, the deed occurred three days before he examined her

Incidentally, we may remark that it does not seem to be probable—to put the matter at its best-that a girl ' aged about 14," who had walked a considerable distance immediately after the rape, would be carried in her old grandmother's arms, even for a few paces; and there is no mention of her having become unconscious as the result of all the bleeding, which is said to have caused her lehnga and legs to be wet,

It seems to us that the story can be explained thus -

Some months before, this girl had sexual relations, with the result that her hymen was torn. Whether this was caused by costus or by manipulations matters not, the point is that she was not so innocent as she might have been, and was not likely to receive minnes from costus on the day in question, such as would cause profuse bleeding. The scratches on her back were probably caused by her having lain on the ground amongst the bushes during the act to which she had been a con-senting party. When all was over she discovered that her little brother had run away, and guessed that he would tell what had happened, so she was ready enough to bear witness that she had been forced to do what she had done. The grandmother naturally tried to save her grandchild's reputation, being ignorant of the happenings of some months before Whence the non mammalian blood came is a question Probably it was that of a fowl, or possibly that of a dove The quarrel about the Juar field, from which the donkeys were driven by the young man, is obviously but a trivial one, but in India small causes such as this often produce great effects such as a charge of rape. The presence · of semen on the lehnga does not lead us to suppose that this act was done "in an acitated and confused manner," as the learned judge wrote. The semen had come from the curl's vagues after she had toushed coutus this is all that can be said of it. Had there been no little brother there that day it is likely that the young man would be still at liberty

56 When the house of one of those accused of having committed a murder was searched, the following articles which appeared to be blood stained were seized by the police A, the bamboo bandle of a dioble, B, a quilt, C, a piece of bamboo matting The man's wife explained that the stains on A were due to betel stained saliva. on B. to bloody disharge from her vulva, and on C, to the blood of a cow As a matter of fact, the stains on A were due to betel probably, while those on B and C

were certainly not due to blood. This illustrates the difficulties with which the police have to contend when investigating a case

A man was killed in a frontier village One Mand was suspected of having taken part in the murder. In his house was found a knife which appeared to be stained with blood This, Vanid said, was that of a sparrow or some animal, but not human blood. The knife was found to

be stained with non mammalian and human blood

58 In the early hours of the morning, a man who was watching his ground nut field fired at a wild pig which was damaging the crop. After wounding the mg which fell, but recovered and bolted into the jungle, the bullet hit a boy who was on watch on a platform about 100 yards away, and mflicted injuries of which he died. A, the sand and straw on which the wounded pig had rolled, and B, some sticks from the platform on which the boy was sitting, were sent for examination On A was found pig's blood alone, on B, human blood alone

59 In a riot about land a man was killed. His faction, A, declared that the riot had occurred in a certain field, and that he had been killed there. The other faction, B, denied this, and pointed out blood marks in canother field as caused by his having been killed there. Some of the bloodstrined straw found there was sent for examination Faction A declared that the blood on the straw was that of a goat, which had been slaughtered to mislead the authorities into believing that the riot had occurred on the land of faction B, and that faction A had been the aggressors instead of the attacked The stains were due to human blood alone

60 The guardian of a mosque one morning found in a corner of the courtyard some blood. This he reported to the leaders of the Moslem community who informed the police. The blood was sent for examination and found to be that of a goat alone. Obviously it had been put too and found to be that of a goat alone. Obviously it had been put mosque by the control of leading the Moslems to believe that the mosque to the medited by the control of the control of the Empine of the control of the control of the mosque to the control of the Empine of the control of the control of the control of the Empine of the control of the Empine of the control of the Empine of the Control of the Empine of the Control of the Empine of the Control of the Empine of the Control of the Contro

61 A man complained that his horse had been wounded when it was at A, in a certain field, and had died of its injuries. The person arrested for the offines showed on the fourth day another place, B, as the site of the deed. The earth from \(\chi\) and B was sent for examination and we found \(\chi\) to be free from blood while B was stained with the blood of a

horse alone

62 \text{\text{\text{N}}} was accused of having committed sodomy with Y a schoolboy agod 12 Y alleged that penetration had been effected without his know ledge as he lay saleep, but that he was awake before the act was con summated. The defence was that the case was false and due to Y having dunned Y for one rupee eight annas the price of a cloth Y as dhost was sent for examination as to seminal stains. There were none in the waste of the same that the same that the same that the same post of the same that the same post of the same that the s

out as the speck was a very minute one inc magnetate next into it includes the story for the prosecution since as he put it, no Sub Inspector of Police gifted with the smallest understanding would have asked for the dhot; to be sent for examination had he known that it had on it a speck of sheep or goat a blood, and the evidence of Y a two room

mates was very clear as to \ s guilt

63 A accused B, C and D of having ravashed her She said that B iteratence her with a sword and ordered her to follow him into the jungle. When she refused, C, who was carrying a stick, aided B to carry her off. Then C ravished her, and B and D, who had joined them, did the same. While D was so engaged she managed to get hold of the stick, which C hald left on the ground beside her and lunged with it at D a face which bled freely, some of the blood dronging on to her bodies. While D was busy washing the blood from off his face she scaped to the house of B, one of her relatives where the best of the blood from the same staged to the house of B, one of her relatives where the best of the blood from the said that B, C and D had come to her place, and that C had given B a push, which caused himto fall on F, A and G B felt ashamed, and ran away. First she had said that B had dragged A away, being aided by C T his she explaned was due to her having been angry, an I she asseverated that it was C who had dragged A away, being aided by D

The bodice of A was found to have on it stains of blood, but as the blood was non mammalian alone, her story was not strengthened by the fact. It came out in evidence that A was the daughter of a man who had been kept in custody for a day by B's father, who was a magnitude; and that II, who corroborsted A's statement of her escape in a state of multry, was at emmity with B's father on account of a quarrel about, money matters. The three youths accused in the ease were discharred.

As an instance of how the police, who receive very little aid from the general public in this country, are forced to utilize every scrap of what might turn out to be a price a conviction in a murder case, I may mention that from Dismond Harbour I received (1) some palm-leaves, (2) a bamboo cane; (3) some bamboo matting; (4) two bamboo poles; (5) a cloth; (6) a piece of rope, and (7) a dhott. All of these were suspected to be blood-stained. On none was there any blood detected, but on the cane were found stains very much like those of blood at first sight, but really due to betel-stained saliva.

#### CHAPTER VII.

#### ASPHYXIAL DEATHS.

The violent deaths of common occurrence which result from asphyxia more or less directly are: (1) Hanging, (2) Strangulation and Throttling, (3) Suffocation, and (4) Drowning.

The post mortem signs of asphyxia which are found in these forms of violent deaths are largely the result of the violent respiratory efforts, at first mainly inspiratory, and latterly

attended by convulsions. They are:-

External (1) Lividity of lips, finger-nails, and skingenerally, to be distinguished from hypostasis by not being confined to the most dependent parts. (2) Prominence of eyes, especially in strangulation. (3) Eugor mortis, slow in onset.

Internal (1) Blood unusually fluid from excess of carbonic oxide. (2) Lungs and meninges of the brain may be either congested or anemic (3) Petechia beneath serous membranes.—These minute extravasations of blood, from the size of a pin's head to a small, bean, beneath the pleural covering of the lin's from the size of a pin's head to a small, bean, beneath the pleural covering of the lin's from blood discuses, such as scurry and purpura, in which petechie are apt to occur. They may, however, be absent in undoubted asphyxua, and are most likely to be present when the asphyxia occurs rapidly. They should be looked for especially at the root, base, and lower margin of the lungs, on the pericardium, under the sealp, and in infants on the thymis gland. They are readily distinguished from hypostasis by their punctage or petechial character.

## Hanging

In this form of asphyxial death the body is suspended by the neck and the constricting force is the weight of the body or head. It is unnecessary that the body should be suspended off the ground or other support, or even that it should be in the upright posture.

Suicidal hanging is a relatively rare form of suicide in all countries. In India, statistics show that between one-third

and one-half of the suicides of both the seves in the town of Calcutta and in the Paniab, and of the male suicides in the presidency of Madras, hang themselves, whilst in Bombay suicidal hanging is rare. Hanging also is the mode selected by about 18 per cent of the temale suicides in the two lastmentioned presidencies All the 130 cases of hanging seen by Dr Mackenzie during nine years in Calcutta were suicidal Sixty-five were male and sixty five were female, and all were adults The alleged causes in these cases were -

Family disagreement 88 Remorse at having led immoral 35 Ill health No reason assigned 24 Grief on account of the death Drunkenness a of a near relation Insanity ñ Serious illness of a child Poverty i Disappointment in love False accusations Jenlousy Found in possession of counter Theft 1 fest coins

The nature of the rope by means of which these 130 persons com mitted suicide seventy three used ropes of various materials and thick ness. Thirty suspended themselves by means of their dhoirs saries, or chadars Twenty five cases were not noted One person, a determined suicide, used both a rope and the cloth he were to destroy himself and a Brahman hung hunself by his Brahmanical thread!

Case - Suicide by Brahmanical thread, - This man was a big, stout Prahman, he returned home late at night boisterously drunk and com menced to abuse his own family and his neighbours. The family, expecting that he would assault them locked him out of the house into the outer courtvard where he entered a cowshed and hanged himself He twisted his Brahmanical thread into several 1ly, and was found suspended off the ground by means of it. The mark of the cord round the neck corresponded with the Brahmanical thread It was very narrow and deeply indented into the skin of the neck, which was parchment-like in appearance

Homicidal cases are rare in India except in lynching Chevers mentions three, one where a woman with the aid of three men, hung her husband in revenge for having beaten her some days previously, another where a husband hung his wife as a punishment for adultery, and a third where the inhabitants of a village, discovering a man from a neighbouring village in the act of committing a theft, hung him on a tree in the middle of their village More frequently in India, in homicidal cases where the body is found hanging, the cause of death is strangulation or mechanical violence, and the body has been hung to avert suspicion (see Cases next page) Accidental cases also are rare but are sometimes met with Judicial hanging this is the judicial mode of execution in India

Case — Marder by strangulation; subsequent auspension of the body — A man of Mymensung, having intraped with a widow, and not giving her sufficient means for her support, she compliance to the village parachayet, who decaded that both parties should be beaten. The man was seized by his father, and was struck several blows, but the woman managed to escape. The paramoure, enraged at having been summoned and beaten before the panchayet, pursued her with three of his relatives On coming up with her, they strangled her, and, hanging her body on ay tree hard by, reported that she had committed suicide — Chevers, Med Jur., p 629

Gase—The father and brothers of a girl, of Tipperali, finding her in company with a man with whom she was intriguing, seized the man, and holling him down by the neck, arms and legs, strangled him. They then hung up the corpse, and reported that he had destroyed himself—

Chevers, thid p 592

Case—A Bogra woman was found hanging Post mortem examination showed clearly that strangulation by hand, and not by hanging, was the cause of death.—Chevers, thid., p. 593

Case — Murder by mechanical volence; subsequent suspension of the body — A man of Sythet struck his wide with a piece of spit hambon about the body until she died, for eating more than her share of par (betel). He then hanged her body on a tree — Chevers, Med Jur, p 537. Case — The wife of a man living in the 21 Parganas having a criminal intrigue with another Hindu, she and her paramour entired the unfortunate man out of his house at might, killed him, or rendered him insensible

(it would seem by severe blows), and suspended his body to a tree — Chevers, \*bid , p 598

Case—It appeared in a trial at Cuttak, that a Hindu, charging another with theft, beat him to death. The man's body was afterwards found suspended, with marks of violence upon it, in such a position as to render

it evident that he had not hanged himself -Chevers, thid , p 598

Case -A man, probably trampled to death body found hanging Hindn, aged about sixty Post mortem appearances-" Face livid and slightly swollen, especially on right side, on which the body had been laid. The tongue was not swollen or bitten by the teeth A bruise about 11 inch in diameter on right side of the forehead A hvid depressed mark, about I inch in diameter, round the neck and behind right ear. In front of the neck the mark was between os hyoides and thyroid cartilage There was another depressed mark under the forehead Head -Consider able amount of coagulated blood in tissues of pericranium, corresponding to bruise on forehead Brain healthy, slightly congested on surface A considerable quantity of fluid in ventricles, and at base of brain Chest -A large quantity of extravasated coagulated blood among muscles and tissues covering the ribs The ribs, from the third to the last, were fractured in two places on both sides, lungs healthy, uncongested, lieart empty Abdomen -- Fxtensive rupture of liver on its posterior aspect, all other organs healthy' —Harvey's Beng Med Leg Rep., p 83

Case —Punctured wound mistaken for a gunshot wound, body sus

Gase—Punctured wound mistaken for a guishot wound, body sus pended after death—In this case, a Mussuman aged that yight, was at first reported to have died from hangung. There was a rope close under the chin, passing upwards behind the ears, and the head was bent on the chest. On lifting the head, a wound, described by the medical officer who made the examination as a guishot wound, was found between the attachments of the steron masted musele, a little above the clavele. The wound confuned a large clot of blood, and its edges were turned downwards and in avails. Apparently it was not seen until the head

was liked. The right lung was torn through from apex to base, an I a circular hole of the same are as the one in the neck, passed right through the right kidney was brinsed but not wounded. A large greatity of the right kidney was brinsed but not wounded. A large greatity of the right was a ri

Case — Sucidal hanging, Partial suspension — In 1907 a Brahman limatic in the cells of the Homlay Police Hospital hanged himself from the bars of the door, 33 inches from the ground, with his secred thread, by Jung in an inclined position — Prof. Powell Bombay

Gase—Death from hanging—Arsenic found in viscora, probably self-administered—In a case from Shahging (Thana district), the body of a Mahar was found hanging to a tree outside a villag. On examination there was found an abrasion of the skin round the neck just below the clim commencing from the thread cartilage, and extending lackwards and upwards on both sides a sith discoloration of the parts around. Both lungs were found gorged with blood and the brain was congested. The mucous membrane of the stomach was red and had yellow patches on it On analysis arsene was found in the viscora, about four grains being present in the contents of the stomach.

Mode of death in hanging depends on the way the cord is applied, and on other circumstances It may be by —

- 1 Fracture or dislocation of cervical vertebre followed by almost instant death from pressure on the spinal cord. This occurs when the body falls some distance before the strain comes on the rope and is the mode of death sought to be attained in undereal humans.
- 2 Asphysia, from construction of the air passages with rapid death Death from pure asphyra does not often occur in hanging though Dr Mackenze stries it was the most common mode in his 130 cases. It may, however occur if the rope is tied low down the neck and a knot or some hard object contained in the ligature presses directly on the tracken.
- '8 Apoplexy, from pressure of the ligature on the large veins of the neck, if the tape is tied too high up the neck.
  - 4 Mixed asphysia and apoplexy —This except in judicial lianging, is the most common mode of death occurring in about 77 per cent. of

those cases of death from hanging in which the cause of death is other

than fracture of the neck

In Dr Mackenzie s 190 cases no less than 119 or 91 54 per cent died from asphyxia, 8 or 615 per cent from asphyxia, as well as apoplexy, 2 or 153 per cent from syncope, and 1 or 0 76 per cent from apoplexy.

Rapidity with which death occurs varies—It occurs almost instrutaneously if the neck is fractured rapidly if death takes place by apiner, and least rapidly if apoplexy is the mode of death. If there is no injury to the spinal cord, and the stoppage of air is not complete, five to eight minutes is the common fatal period, but it is possible that life may be restored after even half an hour's suspension.

Treatment—If the body of the person hanged is cut down before life is extinct, attempts at resuscitation should be made by opening a large vein to relieve the right side of the heart and cerebral congestion, followed by amarinh and firston and diffusible stimulants, especially amarinh and sternutatories, and endeavours to restore the respiration and circulation by manipulation as in drowing which see The attempts at artificial respiration must be persisted in for a long time until natural breathing is established or the case proved to be hopeless.

Post mortem signs —These are generally those of asphy us with the special signs in addition

- 1 Signs of the 'mode' of death eg fracture or dislocation of the cervical vertebre, or the post mortem appearance of asphysia or apoplexy, one or both
- In all the 130 suicidal cases examined by Dr Mackenzie no fracture or dislocation of the neck was found but the following case is reported by Dr H G Johnston of Jamaica, W I
- Gase —Fracture —Dalocation in sucidal hanging —A negro aged 2 (D McL), a sufferer from extensive chronic ulear of the leg, climbed a tree and teed a time (4) inch diameter) bark rope to a horizontal branch, and put the other end of the rope by a slip moose around his neck, and threw himself down about a five foot drop. When found, his feet were only a few inches from the ground, the knot being behind the left ear Theory was a favoure-absolucture of the action.
- 2 Mark of cord—This in death from hanging is usually, but not always, oblique and non continuous is does not completely enteried the leak. It is usually (in about 51 per cent of cases) situated between the lehn and the larynx, and is very seldom (in about 2 per cent of cases) below the larynx. In appearance it is usually a well defined furnow, which, according to the length of the period of suspension, may (a) show no change of colour, or at mosts are all blash, or (b) be confensed and white

<sup>1</sup> Tidy a Legal Medicine, II p 191

at the bottom the edges presenting either no change of colour or being red, and the skin beyond wolet, or (c) if the period of suspension has been long, be dry, hard, yellowish brown, and horny, resembling pareliment

In Dr Mackenzie's cases in which a rope was used, the mark on the neck was well defined, indepted, and parchiment like, while in the cases where cloth ligatures were used, the marks were faint, of a reddish colour, and not narchiment like, except in places where the cloth was twisted, and

where the pressure was creat.

Ahmsons are sometimes found in the course of the mark, but ecclymous is rar and sometimes there may be no mark. After noting the
exact situation and external appearance of the mark on the neck, two
ine some should be made round the neck, one shout an inch above, and
the other about an inch below, the mark. These should be connected at
the back of the neck by a vertical cut, and the skin carefully dissected up
from behind forward. The subcutaneous cellular tissue will then usually
be found to abow a condensed white or yellow line. The underlying soit
parts and the spine should then be examined. Such dissection should be
made also in all cases where strangulation is sussected.

In not one of Dr Mackenzie s 130 cases were the muscles of the neck, the larynx, traches, or large bronchi injured, and in none of them was

there any extravasation beneath the skin of the neck, or blisters above

the constriction of the cord

Much local inpur may be found in cases where, as in judicial hanging,
the body falls some distance before the strain comes on the cord. Such
cases excepted, much local inpur points to strangulation rather than to
hanging, or it hanging be the cause of death, to homiculal; rather than
to sucedal hancing.

8 Other appearances—The Iace may be found pale, the features placed, and the eyes not unduly prominent. This Harvey found to be the most usual condition in fresh bodies, or, especially if decomposition has set un, the face may be found swellen and the eyes proteuting. In only 37 5 per cent of Dr. Mackenra's cases were the eyelds open, and eyebuls protending. Pupils are nearly always shated. Tongo is pressed against the tetch, or partly protraing between them and bitten. Genital organs frequently show signs indecative of excitement, accompanied by discharge of mucca, or sometimes of blood, and in males by emission of somula fluid. Expulsion of urner and faces sometimes takes place thought the season of eath form has been placed in the season of eath form has been placed in the season of eath form has been placed in the season of eath form has been placed in the season of eath form has been placed in the season of eath form has been placed in the season of eath form the season of the superficial art cells, gets of sub plent of the superficial art cells, gets of sub plent ecohymous, and apoplectic effusions into the substance of the lungs, are all inference in happene, but may be pressed.

Salva running in straight lines down the chin and chest are usually found, and if present, are important as indicating suspension

during life

In Dr. Vackennie's 150 cases, in 81 the position of the tongue was noted, and in 41 or 50°61 per cent. it was found to be protunded between the teeth, but not injured, in 61 cases a note was made as to whether it was bitten, and of these the tongue was found injured in 10 or 29°22 per cent. A note was made in 40 cases regarding the eyes, and in 15 or 37°25 cent. A note was made in 40 cases regarding the eyes, and in 15 or 37°25 cases frothy mucus was locked for around the mouth and northils, and in 20 or 20°22 per cent it was found, 91 cases were noted regarding two limes of mucus at the angles of the mouth, and it was present in 22° or 22° AT

per cent The condition of the fingers was noted in 42 of the persons banged, and they were found to be flexed or clenched in 17 or 40 47 per cent The condition of the nails was noted in 15 cases and in every one of them they were found to be of a blue colour In 92 cases 30 or 82 60 per cent had vaginal or urethral discharges Out of 23 cases noted 8 or 34.78 per cent had discharge of feeces from the rectum. In 8 cases the condition of the penis was noted, and in 3 or 37 50 per cent it was found to be erected The hyord bone was found fractured in 24 cases or 25 80 per cent out of total of 93 observed. Notes were made regarding the thyroid cartilage in 64 persons suspended, and of the cricoid cartilage in 11, and in not one of either set of cases was it found to be fractured the 90 cases in which the coats of the carotid arteries were observed, in 31 or 34 44 per cent they were found to be ruptured In 16 or 51 61 per cent of these 31 cases the internal coat in 4 or 12 90 per cent the middle coats and in 11 or 85 48 per cent both the internal and middle coats were ruptured

# Questions regarding Hanging

The chief medico legal questions connected with death by hanging, are —I Was Death due to Hanging? and II Was the Hanging Suicidal, Accidental or Homicidal?

## I Was Death due to Hanging?

With reference to this question, it may first be pointed out that in a case of death from hanging, where the period of suspension has been short, or a very soft lighture has been used, there may be no mark at all on the neck. Hence the absence of a ligature mark on the neck does not absolutely contraindicate hanging as the cause of death

A ligature mark on the neck does not necessarily indicate suspension of the body (see 'Strangulation' p 222), but when due to suspension of the body, it is as a rule, high up on the lneck, oblique, and hon continuous Suspension of the body, therefore, is indicated by the presence of a ligature mark on the neck, with a force proportionate to the degree of agreement of the mark with these characters. In very exceptional cases, however, a mark, possessing all these characters, may be produced without suspension, eg when the body has been dragged along the ground, during life or after death, by a ligature round the neck. In such a case, abrasions of the skin due to the dragging will probably be found (see Case, p 155) Suppose, however, suspension of the body to be proved by direct evidence, or strongly indicated by the characters of the lighture mark on the neck, death may yet have been due to a cause other than hanging and the suspension of the body effected after death a ligature mark on the neck, in all respects resembling the mark left by the cord in a case of death from hanging, may be

produced by suspension of the body after death has been amply proved Casper found that such a mark was produced when bodies were suspended within two hours after death, and Tidy states that an ecclymosed mark may be produced within three. and a non-ecchymosed mark within six hours after death This being so, to establish the fact that death was due to hanging, requires not only proof of suspension of the body, but also proof that such suspension was the cause of death. Such proof may be afforded by the presence of the general post mortem appearances, already enumerated, of death from banging If these are absent, careful search should be made for the presence of signs of death from a violent cause other than hanging. This is extremely important as murder cases are not infrequently met with in India, in which the murderer suspends the body of his victim after death with the object of imitating suicidal hanging (see Cases p 215) In such cases (see first Case) the cause of death sometimes is strangulation, and when this is so the general post mortem appearances present may closely resemble those of death from hanging (see 'Strangulation')

## II Was the Hanging Suicidal, Accidental or Homicidal?

In cases of death from hanging the presumption is always in favour of suicide, even if the body is found only partly suspended Numerous suicidal cases are on record, in which the body was found partly suspended with the feet touching the ground or in a sitting reclining or kneeling posture Powell mentions a remarkable case of this kind (see Case, p 216) Suicide, however may be negatived by the body being found suspended in such a manner as to show that the individual could not have hung hunself A\_ain, supposing the post mortem appearances to show that death was due to languag, the discovery of an irritant poison eg arsenic, in the body but little affects the presumption in favour of suicide mentions two cases in which individuals, after having taken arsenic hung themselves apparently in order to escape the suffering caused by the action of the poison (see, however, Case p 216) Death being due to hanging marks of mechanical violence present on the body only positively contract indicate suicide when the violence indicated is sufficient Mechanical violence to have caused ammediate insensibility short of this if from its characters self-inflicted strengthens the presumption in favour of suicide. That suicidal hanging may follow self-infliction of a very severe wound is shown by a case cited by Harvey in which a man hung himself after inflicting a wound on his throat four inches long, dividing the thyroid

cartilage and cosphagus Non self-inflicted violence, not sufficient to have caused immediate insensibility, may be present in a case of suicide, and in fact form the motive leading to it. Ago of deceased is important, as children rarely commitsuicide

Accidental hanging is rare It is sometimes, however, in with, chieffy in cases were children have been playing at hanging Cases also are recorded where individuals giving a hanging exhibition have been allowed to remain too long suspended, with fatal results In one case an adult was found accidentally hung in a gymnasium, and a very exceptional case of accidental hanging is mentioned by Ogston (see Case, p. 216)

Homicalal cases are also rare —A few, however, are on record where hanging, pure and simple, appears to have been the cause of death eg the three cases mentioned by Chevers, already referred to In such cases, as a rule, a number of persons are conceined in the mirder A person, however, who is weak, or insensible, or oven asleep, may be murdered by hanging by a single other individual Ogston, for example, mentions a case 'where a woman tied a ligature round the need of her husband while he was asleep and then pulled him up" Cases are more common where individuals are first rendered insensible (or it may be killed) by mechanical violence, or by strangulation, and then subsequently hung eg the Bompard Case in Paris

The presence of marks of self inflicted mechanical violence (tends, as already pointed out to strengthen the presumption of suicidal hanging. When marks are present, clearly due to the infliction of mechanical violence by another, such marks may indicate the employment of violence sufficient to have caused (a) death, or (b) immediate insensibility, or (c) insufficient to have caused either of these effects. In case (a) the absence of the general post mortem appearances of death by hanging bytiously confirms the indication of homicide. In case (b) the general post mortem appearances of death by hanging may be present, but still homicide is indicated. In case (c) it is often quite impossible, from the post mortem appearances, to arrive at any conclusion as to whether the hanging was suicidal or homicidal.

If strangulation has been employed previous to suspension, evidence of this may be afforded by the presence on the ricch, in addition to the mark due to suspension of the body, of marks indicating strangulation (see below) It may here, however, be pointed out that two cord murks on the neck, one

having the characters of a stringulation, and the other those of a hanging mark, may be found in a case of simple hanging.

if the cord has been passed twice round the neck

If yery severe injuries are found to have been produced by the cord. ea laccration of the muscles or other underlining soft parts the presumption is in favour of homicide or a long drop. Much injury to the soft parts may, however, be met with in suicidal hanging if the individual has arranged matters so that his body falls some distance before the strain comes on the cord Homicide is obviously indicated if the body is found suspended in such a manner, or the hands are found secured in such a way, as to show that the individual could not have hung himself

## Strangulation and Throttling

Homicidal strangulation is easier to commit than homicidal banging and it is sometimes falsely alleged by defaulting cashiers and others to screen delinquencies Accidental strangulation may happen to epileptics and also through the pressure

on the throat of high collars see case below (p. 225).

In strangulation the constriction of the throat is produced by other means than the weight of the body or head The means used may be fingers (= 'Throttling') the foot, knee, clothing the Strangulation differs from hanging in that it may be effected without a ligature eg by pressure with the fingers or some hard object. The modes of death in strugulation are the same as in hanging hence the post mortem. appearances are also very similar. The main points of difference between the post mortem appearances of strangulation and those of hanging are important as strangulation is usually homicidal, whereas hanging is spicidal

1 Mark or marks on the neck — (1) If a ligiture has been used there will save in very exceptional cases be found a mark on the neck This usually but not invariably, differs from a hanging mark, in being transverse in direction low down on the neck,2 and con-5 tinuous ic completely encircling the neck In exceptional cases of strangulation, especially if the body has been dragged by the ligature, the mark may be found high up on the neck, and oblique in direction, like a hanging mark Again, in exceptional cases of hanging, the mark may be found low down on the neck,

and if the cord has been tightly applied the mark left by it may be transverse in direction. like a strangulation mark Abrasions and ecchy moses in the course of the mark and injury, to the underlying soft parts are much more common in strangulation than in hanging, but the hard yellow brown parchmenty appearance of the skin in the course of the mark is more seldom met with

(2) Strangulation by manual pressure is tolerably common in India the victim being usually a child or a female Where this mode has been employed marks made by the thumb and fingers are almost invariably found on the neck . sometimes however these marks of violence are only visible on dissection. Usually the marks found on the neck in such cases clearly indicate how the strangulation has been effected

(3) Strangulation by compression of neck with a stick or other hard substance is often met with in India Usually one stick placed across the front of the neck is used but sometimes two sticks are employed one placed behind and the other in front of the neck. This mode of strangulation causes a central bruise on the front of the neck, and usually severe local mury such as fracture of the cartilages or hyoid

1 2 Asphyxial and other appearances -The lungs as in , hanging may be found uncongested According to Tardieu patches of emphysema on the surface of the lungs due to rupture of the superficial air cells are invariably and apoplectic effusions into the substance of the lungs commonly present in death from strangulation, while punctiform sub pleural ecchy moses ( Tardieu's spot ) common in suffocation, are rare in strungulation But Professor Powell's unique experience shows that Tardieu's statements are more emphatic than warranted as patches of emphysema are not invariably found ecchymoses are not rare in strangulation or in hanging

Salva running in straight lines down the chin and chest a common appearance in death from hanging is not likely to be present in strangulation

In three cases reported by Dr Mackenzie in none of them were the appearances in the air cells of the lungs or about the skin of the face neck and chest and conjunctiva mentioned by Tardieu found. In all these cases the eyes were closed. In none of them were muscles or other deep structures of the neck injured. In these cases the tongue was not swollen, in two it was protruded between the teeth and was bitten into but not through. In none were the fineers cleenched.

## Questions regarding Strangulation

As in hanging the chief medico legal questions connected with death by strangulation, are I Was Death due to Strangulation? and II. Was the Strangulation Homicidal, Suicidal, or Accidental?

## I Was Death due to Strangulation?

It may first be pointed out that in very exceptional cases, death may occur by strangulation without any mark being present on the neck. This may happen if a soft ligature has been used It rarely, however occurs as even when a soft ligature is employed, much superfluous violence is commonly applied and a distinct mark on the neck is usually present. If no marks of violence either external or internal are to be found on the neck, strangulation is very strongly, but not positively, contra indicated When strangulation has been effected by means other than the use of a ligature much violence is almost always used-often to other parts of the lody as well as the neck-and there is seldom any difficulty in arriving at a conclusion as to the cause of death. Here however, it must be remarked that in very exceptional cases of death from natural causes finger marks may be found on the neck, accompanied by the post morten appearances of death from asphyxin An individual dying from asphyxia the result of disease, eg epilepsy, may, in his struggles for breath by clutching at his throat produce such marks. Hence if the only marks of violence present on the body are slight finger marks on the neck a guarded opinion must be given as to the cause of death

Case—Strangulation () Smoodal) finger marks on the neck probably caused by deceased himself.—A man was found dead in the house of a probabilitie who had been his matries for three year. Deceased security was a sleeping in the same house with another productine, and was called early in the morning by discussed as mistress who appeared to be much alternated why discussed a condition. The consists found him appearably dying and removed him to his own house. A post morten examination was made and aboved death to be due to ope as. There marks were found on discussed at threat such as would be produced by finger mails. The surgeon who made the examination thereupon is protest strangulation to be the cause of death and deceased a matries was fired and convicted of the marker II, however, appeared that deceased had been subject to the matries was tred and convicted of the marker II, however, appeared that deceased had been subject to

epileptic fits, and many of the circumstances of the case being strongly against the supposition of homicide, the High Court reversed the conviction, holding that the marks on the throat might have been produced by deceased himself—Chevers  $Med\ Jur$ , p 580

Ligature mark on the neck, corresponding in external appearance to a strangulation mark, cannot of itself be taken as evidence of death by strangulation Such a mark may be the result of the application of a ligature to the neck after death, or have been accidentally produced by the pressure of a tight-fitting article of dress or be the result of putrefictive swelling against a string tied loosely found the neck. In the last two cases, however injury to the underlying soft parts, common in strangulation is not likely to be found. Hence, even when a ligature mark is found on the neck, corresponding in appearance to a strangulation mark, to establish the fact that death was due to strangulation requires proof that the pressure of such ligature was the cause of death. Such proof may be afforded by the presence of the general post mortem appearances of death by strangulation It must, however, be recollected that in hanging as well as in strangulation by a ligature, death is due to the pressure of a ligature on the neck Further, that in hanging the presumption is always in favour of suicide, while in strangulation it is in favour of homicide Hence, in all cases of death from pressure of a ligature on the neck, all appearances indicating the cause of death to be hanging, rather than strangulation, or itee tersa, should be most carefully noted

II Was the Strangulation Homicidal, Suicidal, or Accidental? Accidental cases are rare a few, however, are on record

Gase—Accidental strangulation by bonnet strangs—Titzabeth Ken chan an extremely dissupated drunken and idsorderly woman went to bed intorceated with her bonned on and in the morning was found strangled in its strings She had fallen out of bed, her bonnet became fixed between the bedstead and the wall and she being too drunk to loosen the strings was strangled—Guy, for Me1, p. 262

Case—Accidental strangulation by neckerchief — A man was carried to bed very dramk, and left there with his clothes on If was supposed that afterwards he had got up so far as to lean over the front of his bed to vount, with his hands pressed on the pit of his stomach as he was found dead in this posture in the morning. His neckerchief was so tight around his neck that the contraction thus caused would have sufficed to produce strangulation from his inability to chunge his position, in the helpless condition he was in at the time. The inspection, by presenting all the appearances which were to have been expected under such circum stances, left no doubt but that accidental strangulation was the cause of death—Ogston, Med Jin Let et, p. 543.

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Case — Accidental strangulation by basket strap — A girl was accidentally strangled in the following manner: She was employed in carrying fish in a basket at her back supported by a leather strap passing round the front of her neck above her shoulders. She was found dead siting on a stone wall, the basket had slupped off, probably while she was resting and had thus raised the strap which had firmly compressed the wind nue—Taylor. Med. Jur. 11, no 57

Cate —Accidental strangulation by high collar —A gentlement farmer, W H of Kingschift, near Peterboro, duel yesterday of strangulation during a heart seasure through his throat falling forward on his high collar and causing asphyxia. Major G P, of Plimico, died in November last under similar circumstances — Davig Express (London), Jan 28 1020

Suicidal cases of strangulation by a ligature are sometimes met with To effect suicide in this way requires the employment of some means whereby the lighture is kept tight, independently of any muscular effort on the part of the suicide . so that relaxation may not occur when insensibility supervenes This end may be arrived at in various ways, eg by simply passing the ligature more than once round the neck, or, by securing the ends of the ligature to the foot, or to the wrists in such a manner that the ligature is tightened when the arms are extended, or to some fixed object " Or, it may be arrived at by twisting a stick in the tied ligature, and securing the end of the stick, or by simply knotting the lighture As regards this last method, it may be noted that the presence of more than one knot raises a suspicion of homicide, two knots have, however, occasionally been found in suicidal cases, more than two knots very strongly indicates homicide

Homicidal cases.—Just as in hanging the presumption is always in favour of suicide, so in strangulation the presumption is in favour of homicide. Homicide is veil strongly indicated, (a) when a ligature has been employed, by the absence of evidence indicating the use of some means for the purpose of keeping it tight after insensibility has occurred, (b) by the presence of signs indicating the application of much violence to the needs or to other parts of the body, and (c) when the strangulation has been effected by means other than the use of a ligature. Obviously homicide also is almost conclusively indicated if the hands are found tied together in such a way as to show that they could not have been so secured by the individual finnself.

Case — Homicidal strangulation — On April 4, 1898, Shakh Harn left his home in good health and the same evening his body was found tied up in a box, and Mihir Ali, of the Doretion Institution, was suspected of the crime At the jost morthy examination made on the day of the death, the body was found:

\*\*The death, the body was found.\*\*

of jute, another of hemp and a third of cotton. Thighs flexed on the abdomen, the legs on the thighs, the knees resting on the left side, and middle of the chest 34 inches above the left nipple Left arm was tied above the wrist to the left leg, 10 inches below the left knee Right arm was tied to the right thigh 6 inches above the right knee. The first cord was of tute It was about a meh in diameter, it was tied round the lower part of the neck, the knot was double, it was tied on the front of the lower part of the neck just above the manubrium of the sternum. It was then carried downwards over the middle of the chest behind the knees. then powards along the left side of the chest round the back of the lower part of the neck, then downwards along the right side of the chest to the right wrist, where it was tied to a narrow hempen cord. The hempen cord was t of an meh in diameter, at its commencement it was double; it passed from the back of the right wrist downwards for about 3 inches to the middle and outer side of the right thigh, it then passed backwards round the lumbar region to the back of the left elbow At this place the cord became single at then passed round the left forearm, 8 inches above the back of the left wrist, then across the middle and front of the right thigh, and was tied here to a part of the same cord, where it was turned backwards round the lumbar region The third cord was made of soft cloth, it was twisted round into two ply, and then doubled It was tied tightly round the lower part of the neck the colour of this cord was white with a streak of pale red and another streak of light pale blue in it It was tred tightly round the lower part of the back of the neck by means of an ordinary double knot This cord was beneath the jute cord An abrasion 3 inches long and a of an inch broad on the right cheek extended out wards from the right angle of the mouth The abrasions of the lips and abrasion at the right angle of the mouth and on the right cheek had the appearance as if a gag had been applied to the mouth. The other agas of strangulation were present. Opinion that the deceased died from asphyxia, due to strangulation Mihir Ali was found guilty of murder, and sentenced to be hanged, but his sentence was commuted by the Government to transportation for life -Dr Coull Mackenzie, Ind Med Gaz , 1888, p 232, etc.

Case -- Homicidal strangulation -A gharami, or thatcher, named Gopal Bairagi, eloped from his native village in the Birbhum district with a young woman named Bow and the pair came to Calcutta and lived as husband and wife The neighbours said they frequently quarrelled On the night of the 8th July, 1878, they retired to bed, and on the next morning the man could not be found, and the body of the woman covered with a quilt and a gunny bag, her mouth gagged with a piece of cloth, and a corr rope tied tightly round her neck. The body, examined on the 9th July, showed a mark of a cord round the neck immediately below the thyroid cartilage and a contusion of the left A piece of cord was twisted twice tightly round the mouth and a double cord made of two twists of thin corr rope tied tightly across the middle of the neck The skin beneath this cord was parchment like There was no extravasation of blood beneath the skin or into the muscles of the neck, nor injury to the muscles of the neck or to the wind nine Ornios that the deceased died from asphyxia due to strangulation Gopal Bairagi, after some months, returned to his native village, where he was apprehended He was tried at the High Court and acquitted, as the only evidence against him was circumstantial, which the majority of jury (natives) would not rely on

### Suffocation

Under Suffocation' are included all cases of asphyria (drowning excepted) caused by violent means other than direct pressure on the wind pipe as for example —(1) B; cleaning the mouth and nostrils, (2) by pressure on the chest, (3) by blocking of the lumen of the glottis or air tubes, and (4) by an atmosphere deficient in oxygen

- 1 Closing the mouth and nostrils—This may be (a) Homicidal as in crees of infanticide effected by closing the mouth and nostrils with the hand. The mouth and nostrils in homicidal cases also may be closed by plasters applied to the free this was the way in which the resurrection men, Burke and Hare murdered their victims in Eduburgh. Burke after conviction confessed to sixteen murders effected in this way in a few mouths. Again soft pillows may be employed as in the case of the two [rinces murdered in the Tower of London (b) Accidental, as in cases where children are accidentally smothered by their mothers overlaying the infants in bed (c) Suicidal—Cases of suicide effected in this way are extremely rair. Taylor however mentions a case of a woman who is reported to have committed suicide by simply leaning with her mouth and nostrils pressed against the bedelothes
- 2 Pressure on the chest -Suffocation caused in this way is generally accidental usually occurring from either accidental smothering ly lurial under the debris of fallen buildings earth. etc or pressure in a crowd as in the case which occurred in Paris in 1837 in which twenty three persons were suflocated in this way in a crowd in one of the streets. A case also is recorded of a man who while a plaster cast of his trunk was being taken was nearly killed by the pressure on his chest of the solidifying plaster Homicidal cases are sometimes met; with in India In homicidal cases if the victim is an adult, and was not first rendered insensible or was not a consunting party probably several persons will be found to have been concerned in the murder Often great violence is used some times causing symmetrical or nearly symmetrical fractures of the ribs (see p 127) In children great violence may be em played sufficient in fact to cause extensive unjury to the lungs without fracture of the ribs Under the head of homicidal suffocation by pressure on the chest may also be mentioned (1) the burial alive of willows with their husbands body a custom formerly prevailing to a certain extent in India, and (2) the samadh or burial alive of lepers—often with the consent

or at the entreaty of the victim—cases of which used formerly to be not infrequently met with in India Suicidal suffocation by pressure on the chest is hardly possible

- 3 Closure of the glottis.—Suffocation thus caused often occurs accidentially from the impretion of foreign bodies—masses of food, for example—in the throat or air passages, often by pieces of food during an inspiration act whilst vointing especially if drunk or under the influence of chloroform, or by swallowing false teeth etc., or from spasm of the glottis, the result of disease or of the inhalation of poisonous or irrespirable gases. Powell reports a case of this sort by impretion of a round worm in larynx. Succidal suffication by closure of the glottis effected by iorcing rags articles of dress, etc., into the fauces is sometimes mot with. Homoidal cases are rare in adults. Children, however are sometimes murdered by filling their mouths with mud or other soft material.
- 4 Deficient Oxygen such as the fumes of wine or beer vats, or bursting of the carbonic acid pipes in a refrigerator

# Post mortem appearances in death from suffocation.

- 1. Appearances of asphyxia—Cases, however, have occurred of undoubted death from suffocation, where most of the post mortem appearances of asphyria were absent. On this point Christison, in the case of the woman Campbell, murdered by Burke the resurrectionst, remarked "the conviction in the public mind that a well informed medical man should always be able to detect death by suffocition, simply by an inspection of the body, and without a knowledge of collateral circumstances, is erroneous, and may have the permicious tendency of throwing inspectors off their guard, by leading them to expect strongly marked appearances are every far from being always present, ought to be distinctly understood by every medical man."
- 2 Punctiform sub-pleural ecchymoses, or 'Tardieu's spots' (p. 221 and below) are usually present in cases of sufficeation Powell reports two large apoplectic effusions in a child whose death was caused by plugging the larynx with a rag
- 3 Appearances of violence sufficient to cause sufficienting, e.g. marks of violence on the chest, marks indicating the application of manual pressure, or of plasters over the mouth

and nostrils, foreign bodies impacted in the throat, etc Cases, however, of death from suffocation by violence may occur, and no appearance of this class be present

## Questions regarding Suffocation

As in hanging and strangulation, these are —I Was Death due to Suffocation? and II Was the Suffocation Accidental, Suicidal, or Homicial?

I .- Was Death due to Suffocation?

The chief points bearing on this question are -

1 The signs of asphyxia may be nearly absent, and yet death may have been caused by suffocation (see Christison's remarks just quoted)

- 2 The signs of asphyxia may be present, and those of drowning, hanging, and strangilation absent, and yet death may not have been the result of suffocation by violence, but may have been due to asphyxia the result of disease, or poison, eg epilopsy tetanus, or strychna poisoning Hence, in cases of alleged suffocation by violence, much depends on the presence or absence of signs indicating the employment of violence, such as would produce suffocition. If these are absent, no positive opinion can be given, from the post mortem examination alone, as to the cause of death.
- A Tardueu's spots (p 213) If these are numerous, well defined and limited in size, on the lungs and thymus gland they contra-indicate strangulation, and indicate suffoction to be the cause of death. Their presence however, is consistent with death from causes other than suffoction. They have been met with in the bodies of adults after death from drowning, hanging, strangulation scarlatina, heart disease, apoplexy, pneumonia, and relapsing fever. They are almost the rule in plague. They are also found in the bedies of stillborn, and even unborn, infants. Further, their absence does not, at any rate in the case of adults conclusively contraindicties suffocation. Ogston failed to find them in nine cases of death from suffocation in adults.

II -Was the Suffocation Accidental, Suicidal, or Homicidal?

1 If the deceased is an adult, the presumption is always in favour of accident Curious accidents leading to suffocation

by closure of the glotts sometimes occur. Suicidal cases are rare, but are sometimes met with, eg, the case of suicide by closure of the mouth and nostrils already referred to above, p. 228. A case also is reported in which a prisoner committed suicide by stuffing his mouth with rags, another in which a young woman suffocated herself by stuffing a large ball of hay into her throat, and another of a young woman who committed suicide by shutting herself up in a trunk. Homicidal cases are not often met with. In a homicidal case, unless the victim was suffocated while insensible, marks showing the employment of much violence will probably be found.

Case -Accidental suffocation by plums .- Dr. Mackenzie relates that of a native female child of about four years of age, who, while playing about under a country plum tree, ate a quantity of its unripe fruit, and was shortly serred with a severe attack of vomiting. The parents took her to a native practitioner, who, after giving some medicines, recommended that she should be removed to hospital, but on arrival the child was dead. The body, examined the next day, was found well nourished with no external marks of violence The finger nails were of a blue colour, the eyes not sunken, and the skin of the fingers and toes not shrunken The lungs, the liver, the spleen, the kidneys, and the vessels of the brain were congested. The heart was healthy, the right side full of dark fluid blood, the left side empty. The stomach, the intestines, the bladder, the uterus, the ovaries, the vagina, and the substance of the brain were healthy. The larynx, traches, and large brouch were full of half digested green plums, and the stomach contained a quantity of half digested green plums. The intestines contained well formed faces and half digested green plums No bones were fractured. OPINION: . That the child died from suffocation owing to the half digested green plums passing into the air passages during a deep inspiration while in the act of vomiting -Ind. Med. Gaz., 1890, p. 295

Case —Accidental suffocation by meat —A Luropean sailor, J. K., (who had been drunking beavily, while eating a mutton chop begin to bromit and suddenly became mensible. He was removed to hospital, but on arrival was dead Post mortem a piece of the chop, 3\cdot '\cdot 1', was found firmly wedged into the entrance of the laryux

Case.—Suffocation in a Chest—A sweeper in the Byculla Club Bombay, in the liabit of sleeping in a wooden trunk, was found deal of suffocation in 1910. The lid, which was almost vertical when open, had accidentally fallen down and the hasp had become fastened — Jynh. Proceil's Reports, 1917.

Case.—Accidental suffocation.—"In 1850, Dr. Whyto reported the case of a strong Mainra water-carner into whose mouth a fish had jumned while he was briting. On opening the mouth, the tail of a large cat fish presented itself, with the body firmly fixed within the fauces, and filling up the isthmus completely. It had entered flat, so that the fin of one sule was posterior to the velum, and opened out on any attempt being made to withdraw the fish. The operation of exophagotomy was commenced and was abandoned. A piece of cane was made into a probang, and, with it, attimpts were made to press the fish downwards into the

osophagus It did pass don nwards when the patient at once ceased to breathe, gave one convolves struggle and died to all appearance. The traches was mmediately opened and respiration was raisored. In the course of the might the man coughed up the fish, the first having become softened by decomposition. "—Chavers, Med Jur. p. 619

Car — Accelental suffection — in 1865, a patine boy about four journ old was brought to the Calcutta Melenal Codlege Hopptol with a core fich unpacted us has glotts. These fish are very tennesses of life out of water. The poor child appears to have taken up the fish and to have put its bead into his month. In its struggles its head passed the glotts, and all attempts to with first its vere practical by the catching of its gill plates, anchor was, below the vocal chords. The child was sufficient — Chesters, 6t. n. 620

Case—Accidental sufficiation—"A private soldier, et. 28 wis discovered at night by the man lying each to time to be breathing leadily and with great difficulty, as if there were some obstruction about the lower part of the timelas. He was at once removed to the dispensary, where he died in about fifteen minutes. Several small pieces of potato were found in both broughted tubes where these subdivided into small branches. There was great orderns of the glottly no doubt from the irritation caused by a foreign bely. The decessed had drink some beer irritation caused by a foreign bely. The decessed had drink some beer fifteen that been sick, and had vomited while mig. I believe returns to red. He had been sick, and had vomited while mig. I believe returns to red. 15 min. 15 mi

2 If the deceased is a child or infant swiede is, of course, contra indicated, and the question lies between secudort and homicide. Accidental cases often arise from overlaying, or from accident during birth (see 'Infanticide')

Fatal overlaying of infants by parents in bed through cossesses occurs chiefly amongst the poor, and is rare after nine years of age as the child is then strong enough to extreate itself. In suspected overlaying the death may sometimes be due to fatal teething or cerebral convulsions during the night. In addition to marks of suffocation, marks of pressure on the body or face should be looked for, eg a flattened nose. Casus are reported by Dr. Westcott coroner of N.E. London (Trains Med. Log. Soc., I. 1903, 44), of overlaying of infants by the domestic eat and by the infant burying its face in a pillow

Homicidal suffocation is sometimes met with in children, and frequently met with in infants by stuffing the mouth with rags, or filling it with condung or durt, these being common modes of infanticide in India.

Case —Homicidal suffocation.—A lad from threteen to fifteen years of age was sentenced, at Agra, to transportation for life for having robbed a girl of four, his near relative of her ornaments after having filled ber mouth with blues (bras). The civil surgeon deposed that death had

been caused by suffocation consequent upon the mouth of the deceased being filled with bhusa —Chevers, ib, p 616

Case—Homucada suffection—An old woman of Trhut, finding a little grid of ax digging up some grain from her field felled the child with a heavy clod, and then suffocated her by pressing her clothes against her mouth until she ceased to breathe

She then stripped off the clothes and ornaments, and burned the corpse—Chevers, it., p 61

Case —A gril aged about twelve Body far advanced in decomposition, no marks of volence externally but on cutting into the skin of the clest, extensive bruises and bloody effusions were found over the whole front aspect of the ribs. The ribs were not fractured The right lung was natural, but the left had been most severely injured by compression and had become a jelly like mass. The gril had probably been thrown down, and then had her chest compressed by the weight of her assailant is body —Dr McRedde in McLeods Beng Mad Leg Rep. 1869-80, p 36

## Drowning.

This mode of volent death from asphyxia is by submersion of the mouth and nostrils under water or other fluid, so that access of air to the lungs is cut off. This form of asphyxial death differs from the other forms, in that water or other submersing fluid is drawn into the lungs during attempts at respiration.

Causes.—Accidental cases are common among the senfaring population of the coast and inland, especially among females, from falls into wells and tanks

Suicidal cases are also common in India. In the Madras and Bombay presidencies, over three-fourths of the female and nearly one little of the male suicides drown themselves. In Luropean countries also, drowning is a mode of suicide often selected, ranking, is a rule, second in order of frequency. In Dr. Mackenzie's 305 cases of drowning at Calcutta, only 262 per cent were suicidal, the reasons assigned being family disputes instituty, and bodily disease. Homicidal cases are rate, but are sometimes met with in India. Dr. Mackenzie had only one such out of 305 cases.

Mode of Drowning.—When a person falls into water he sinks, but usually, if not stunned, rises again to the surface, probably by the movements of his limbs, and tries to breathe, in which case death occurs by asphyxia. In his struggle, he takes in some water, which striking the glottis causes cough and forcible expiratory efforts, and the raising of a portion of his body out of the water, causing him to sink a second time

## ASPHYXIAL DEATHS

He may again rise to the surface by the movements of his limbs, again struggle, and sink Ultimately, in consequence of the expulsion of our from the lungs, and the specific gravity of the body long greater than that of water in the proportion of 1 03 to 1, the body ceases to rise The subjective sensations are said by the resuscitated to be mental confusion followed by pleasing dreams Where the person sinks at once and does not rise again during life death is due to 'inhibition' or some precedent condition, eg syncope, epilepsy etc.1 Submersion of the whole body is not necessary for drown-

ing as drunkards, epileptics, and children have been drowned in shallow puddles or vessels containing only a few inches of

Circ -- Drowning in shallow water -- Dr A Lowell gives these two cases -Patu m. of 20 hable to epileptic fits for which he had been tuder treatment at intervals for two years went to work in some inidal nice land on 14th May 1890 in hour later he was found dead lying with his face downwards in a shallow pool. The water was so shallow that only his mouth nose and the right side of his face were immersed the left eye and at le of face being above the surface. The rest of his body from the neck downwards was on dry groun ! Post mortem - The mouth nasil cavities and air passages contained mud and green water weeds — Ind. Ved. G.1: 1897 p. 800

Case - Vazh at 26 attended in hospital for epilepsy On August 23 1890 she was found dead face downwards in an almost dry drain. I neasured the depth of the water at once and found the maximum or some distance to be 2 inches except a depression of 31 inches where ter head had lein Post morten—hir passages contained sand and muddy waters with a few blades of grass skin of face soddened a la lanchusecuse elsewhere cutis ancernna marked. Uterus contained an

For other two cases see Appendix

Mode of death -In the great majority of cases death is ue to asphyxia Almost all the balance is due to inhibition syncope Apoplety if by this is meant cerebral hæmorrhage most rare and if prominent would be the cause of death and et drowning Excitement, whether due to a struggle against owning or against an enemy in a fight, or trying to catch a un, will make a diseased artery give way and cause apoplexy

In Dr. Mackenzie s 805 cases 297 or 97 37 per cent. persons died from physia 1 or 0 32 per cent. from syncope, 1 or 0 32 per cent. from oh xia and apopley, and in 6 or 196 per cent the mode of death could be ascertained on account of the bodies being in a very advanced

Period at which death takes place -This varies with mode of death It is instantaneous if from shock, rapid if;

F Crookshank, Trans Med Leg Soc, 1910 13 21

from pure asphyvia, less rapid if from a combination of asphyxia with syncope or cerebral congestion. When death occurs from pure asphyain, asphyain commences as an outside limit after two minutes' complete submersion and death takes place within five minutes. Recovery is rare after five minutes' complete submersion.

The longest record dive under water is 4 minutes 45½ seconds by Miss I. Wallenda in a tank at the Albambra Music Hall, as tested by expert timekeepers—Whitater's Almanack

Treatment should, however be persevered with, until it is certain that death has taken place, (a) because in exceptional cases animation has been restored after more than five muutes' complete submersion (b) because the submersion, although alleged to have been complete may not have been so, and (c) because by persevering treatment, individuals have been recovered, who have shown no signs of animation for several hours, in one case of recovery it is said that there were no signs of animation for \$4\$ hours

Period at which dead body floats.—The body eventually comes to the surface if not entangled when purtefactive gases make it sufficiently light to float The length of time for this varies with the temperature of the air, water, the sex, etc. Fat bodies float sooner than thin In hot weather a body may float within 24 hours after drowning, but it is seldom possible, to estimate from the bodies the length of time since death

In the Hughli river at Calcutta Dr Mackenzie found that if there was no obstacle to impeled the rising of bodies they generally floated in the hot and ramy season within 24 hours of the immersion, and in the cold season in from two to three days! In Dr Mackenzie a 805 cases, in 183 or 4529 per clint putrefaction was present in 5 or 163 per cent the bodies were saponified, in 124 or 4 05 per cent the bodies were fresh, and in the remaining 38 or 12 45 per cent no note was made as to their condition.

Case —Buoyancy of decomposed body —A woman was killed on the night of a Friday, and the evidence went to show that the body must have been thrown into a well about madmight. On the following bunday morn ing about meal time, which was about 10 or 10 AM, the body was found floating with a heavy stone attached to it. The woman was said to have been of slight figure and short stature and therefore probably, when alwe, did not wrigh more than 100 to 105 lbs. The stone itself weighed 32 lbs. so that the decomposition in 30 hours must have been so rapid as to generate gas capable of raising not only the body itself, but the dead weight attached to it. The stone was attached to the wasts, and the body, when

<sup>1</sup> Ind Med Gaz, 1889, 181 See also Art by Prof Powell in I M G,

found, was lying borizontally on the surface of the water on its subs. The water was from the the tribe feet in depth, and the specific gravity of the stone was 27. This case is of interest, as showing the extreme buoyancy of a decomposed body in water, and the rapidity with which gases can be generated. The murder occurred in September, 1883—Gribble, Med. Jur, p. 99.

## Treatment of Apparently Drowned Persons.

Attempts at resuscitation should be commenced at once I rate get not do any water in the mouth, and upper air passages, i.e., by placing the body for a few seconds, face down, with the head a little lower than the fact Leeping the mouth open, and the tongue drawn forwards Next turn the body on the back, as quickly as possible, strip it, rib it dry, and apply warmth



Fig. 21 -Schmfer's Mode of resuscristing the Apparently Drowned.

to the surface and neak ammonia or snuff may be held to the nostrils by some other person. If respiration is not restored, commence artificial respiration immediately

Artificial respiration.—The best and easiest method of profroming artificial respiration is Schnefer's. It is sfor, more efficient and esier to apply than the older methods of Marshall Hall (prone pressure and rolling), of Howard (supme pressure) and of 'slie seter (forcible traction on the arms, followed by bringing these back to the side of the chest, and pressure on the chest). In the Schrefer method, amongst other advantages, the free of the person blurg placed downwards the tongue falls

L A Schmier, in Medico-Chirurg Trans , 1901

downwards and out of the way of the wind-pipe whilst water and mucus run out, and the muscular evertion required by the operator is very much less than in the other methods. Its mode of application will be seen from the illustration

Directions -- Instantly on removal from the water place the patient face downwards on the ground with a rolled up coat under the lower part of the chest so that the head hangs down and the patient s arms bent and placed under his forehead to keep nose and mouth clear of the ground. The operator puts himself athwart the patient, or kneels by his side facing his heal. Then place your hands flat over the lower part of the back (lowest ribs) one on each sile, and gradually throw the weight of your body forward on them so as to produce firm pressure which must not be violent, on the patient's chest By this means the air (and water, if there is any) is driven out of the patient's lungs Immediately there after raise your body slowly so as to remove the pressure, but leaving your hands in position. Repeat this forward and backward movement (pressure and relaxation of pressure) every four or five seconds other words, sway your body slowly forwards and backwards upon your arms twelve to fifteen times a minute without any marked pause between the movements This course must be pursued for at least half an hour, or until the natural respirations are resumed. If they are resumed and, as sometimes happens again tend to ful the process of artificial respira tion must be again resorted to as before Whilst one person is carrying out artificial respiration in this way others may, if there be opportunity, busy themselves with applying hot flannels to the body and limbs, and hot bottles to the feet but no attempt should be made to remove the wet clothing, or to give any restoratives by the mouth until natural breathing has recommenced Hypodermic injections of atropine sulphate (1) th to rath grain) and of supra renal extract (either as adrenalin chloride or in any other form) may be used to assist recovery

When spottmeons breathing returns, apply heat by waterbrith or friction and when swallowing returns give a little brandy and water. This treatment should be persisted in for several hours—flushing and convulsive twitchings of face and gasping indicate returning breathing. The prospect of resuscitation is better when the cause of apparent death is inhibition than in asphyvia

## Questions regarding Drowning

The chief medico-legal questions connected with drowning, which must be kept in view when making the examination, are —(1) Is life extinct? (2) The manner and cause of death What is the probable cause of death, was it Drowning or some other cause operating before immersion? and (3) Was the Drowning Accidental, Suicidal, or Homicidal? The first question is answered under the 'Signs of Death.'

II Was Death due to Drowning or to some other cause operating
before immersion?

Signs of drowning in body —The external signs will vary according to length of time the body has been submerged. As in 875 per cent of cases of death from drowning, the mode of death is asphyria pure or mixed the post mortem appearances of death from asphyxia vill usually, but not invariably be found. Thus usually the right side of the heart will be full and the left side empty and the lungs and venous system engogred. Great congestion of the lungs cycloally if accound panied by sulf pleural céclipmons indicates that the struggle for life has been great. Whether howe er, the post mortem appearances of apacea are present or not, other appearances indicative of death from drowning must be seurched for, because (a) asphyria if present may have been the result of causes other than drowning and (b) the mode of death may not have been appearance and continued to death may not have been appearance and the death from the death of death may not have been appearance and the death may be due to drowning.

Post mortem signs other than those of asphyvia which indicate death by drowning are as follows ---

#### Externally

- I Froth in the mouth and nostris —This froth like fine 'd'ating Ither although usually present in death from diowning disappears soon after the body is removed from the water It is often also present in death from causes other than drowning '8 of mepilepsy and in cases of death from sankyan and the to drowning.
  - 2. Cuita anterna, or goose skin if present indicates that immersion took place either during I to or shortly after de the no conclusion can blowester be drawn from the absence of this appearance. Powell points out that it is due to contraction of the crector muscles of the hairs and that it dis uponance mortis which is meanly early.
  - 3 Retraction of the penis —This is the result of cold terror in a arduous striggling and is frequently found in cases of drowning, it may be absent in tropical waters the coller the water, the more marked is the shrunker.
  - 4 Sand mud weeds sticks etc grasped in the hands or sticking under the nails are evidence of struggles in the water during life and hence presumptive evidence in favour of death having been caused by drowning abrasions on skin especially hands.

#### Internally

1 Water in the stomach especially if this contains matters such as are present in the water of immersion e.g. algor hadons to. Water is usually for aid in the stomach if the individual was femable at the true of immersion. It is highly improbable that after death, water can enter the stomach, hence the presence of this post mortem appearance indicates it to be highly probable (a) that the individual was sensible at the time of immersion, and (b) that as a consequence death was due to drowning, though not necessarily regativing either of those probabilities absolutely Powell found water in the stomach in about 60 per cent of cases of drowning.

- 2 Water in lungs The lungs are distended with indrawn water and full of bloody froth in bronch; so that Powell points out, the distended, lungs icel sed len and edematous and do not collapse on opening the pleura. Water may transude into the pleural cavities.
- 8 Mad, sand or floating matters mixed with water in the lungs or wind pip.—This is evidence of even greater value than the last mentioned appearance in favour of the supposition that the individual was sensible at the time of immersion, and that, therefore, death was most probably due to drowing

In conclusion it must be remembered that in many cases where death is undoubtedly due to drowning, post mortem evidence may be indefinite or altogether absent. In such cases, it is the duty of the pathologist to say he has found no evidence or no definite evidence of drowning but that such finding is consistent with death from drowning. In many such cases where no lay evidence is forthcoming juries usually give the verdict of 'Found Drowned. A more logical verdict would be 'I ound dead in the water.' As decomposition advances cutsa anservana, froth in the nostrals froth and water in the lungs and water in the stomach successively disappear. The penns and scrotum become ballooned with emphysema. Hence, in all cases of suspected drowning the post mortem, examination should be held at the earliest possible opportunity.

It should be noted that the post mortem appearances of death by drowning may be altogether absent, and yet drowning may have been the cause of dorth. In such case the absence of appearances indicative of death from a cause other than drowning cg violence, poison, or disease, must be ascertained

by careful search

## III Was the Drowning Accidental, Suicidal, or Homicidal?

Death from drowning is, as above noted, usually accidental, more seldom suicidal and rarely homicidal except in infants. The fact, however, of the body being found in water does not necessarily imply death from drowning as the person may have been murdered first and afterwards thrown into the water. Thus the body found in water should always first be examined for marks of violence.

On the other hand, some suicides inflict.

wounds on themselves before drowning and have even need their feet togethen and weighted their bodies with stones, etc Valuable indication of insamity or otherwise may be obtained from pripers or notes in the clothing (N B—Sodden papers should be unfolded in water and not first of all dried). Some times no indications are afforded as to whether accidental or smooth.

- 1 Marks of violence on the body -All cuts bruises, or abrasions should be especially examined as the presence of inflammatory action indicates an injury received sometime before death Very often such marks are due to accidental injury at the time of immersion or but less often to minry after immersion. Hence in a case of death from drowning such marks do not andicate homicide unless from their nature or from the circumstances of the case the possibility is excluded of their being due to (a) injuries received at the time of impression owing to the body strikin, in its fall against some hard of ject. or if the fall had been from a great height against the surface of the water Lodies found in wells frequently exhibit severe injuries caused in the first of these two ways and fracture and dislocation of the cervical vertebrae have resulted from the head striking farcibly against the bottom of a shallow hath A am, a case is recorded in which dislocation of both arms backwards was caused by the lody after falling from a great her ht striking the surface of the water with the arms out stretched (b) Injuries received after immersion during life or after death eq a case is reported where a mark of a ligature on the neck was produced by the string of a closk cetting tightly drawn round the neck during the struggles of the diowning person, and another where fracture of one of the cervical vertebra was caused by the muscular effort of throw ing the head violently back on contact of the body with the water Obviously also severe injuries may result from the hody during life or after death leing forcibly dashed against some hard object, eg a rock or wall or the pier of a bridge. or from the bites of animals.
  - 2 Ligatures are found round the hands or feet or weights are found attached to the body. In such cases accodent is control inducated. If the highings are found inclusions such as my that the individual himself could not have tied them (but not unless this is the case) suched also is contra indicated.
- 3 The body is found in shallow water.—In this case accident is contra indicated unless the individual was intoxicated or insensible at the time of immersion or a child in a tub

of water Suicide is not contra indicated, as cases are known of individuals drowning themselves in water only a few inches deep If drowning in shallow water is homicidal marks of violence due to the force employed in holding the victim under water will usually be present. Here it may be mentioned that in some parts of India a form of ordeal to which women suspected of witchcraft are in some instances subjected, is holding the head under water during the time an arrow is shot from a bow and brought back to the place from which it was shot I

Case -- Weeds in mouth indicate site of drowning -- The body of a child was foun I in a tank at a consi lerable distance from his own house. and suspicion was naturally excited that he had been conveyed thither an I made away with Dissection afforded clear evidence of death from drowning the fauces larynx and trachea contained small portions of green vegetable matter and the right bronchus was almost completely filled with so large a portion of an aquatic weed doubled togetler, that it appeared astonishing how any such body could pass the riva It was afterwards proved distinctly that no weed of the kind grew in the tank where the body was found Further inquiry led to the discovery that the boys body had been found by a woman in a tank near his home in which the weed lodged in the air passages grow abundantly. This female had conveyed the corpse to the more distant tank which belonged to a person against whom she bore a grudge -Chevers, Wel Jur For other cases see Appendix VII

Gribble Med Jur p 154

# CHAPTER VIII

# BURNS AND SCALDS

Burns' are injuries produced by the application of flame or heated substances to the body, while 'scalds' result from the application of steam or hot highful of or near its boiling point. The effects of burns and scalds are essentially the same. Injuries caused by the application to the surface of the body of corrosive substances, it such substances as cause chemical destruction of the ussues, may also, for medice legal purposes, be classed as burns. The chief medico-legal questions connected with burns and scalds are —I is the injury a burn or scald, and if so, how was it caused if II. Was the injury inflicted during life? III Was the injury inflicted by another? and IV What results followed, or are likely to follow, from the injury?

I --- Is the Injury a Burn, or Scald, and if so, how was it caused?

A conclusion arrived at in regard to this question may be of importance.

1 By sr 201 and 205 of the Indian Penal Code, the causing of hurt or greevon burt, by certain specified means is male an office punishable more severely than whey such means have not been used. Among the means specified in these two sections are not only what may be called lethal weapons (see pp 117 cf seq ), but also "fire or any heated substance" or any 'corrossive substance or "explosure substance"

2. It may affect the question of the guld or unocence of an accused person. In this respect it may be of much importance to determine, if possible, the procise means when the injury, if a burn was produced, or a thirtee produced by the application of a particular heated solid or washington, and the produced by the application of a particular accession.

Degrees of burns.—For preduce-legal purposes, injuries caused by the application of heated substances to the body luny be divided into (1) Burns producing mere redness.

(2) Burns causing mere vesication (3) Burns causing the death of the part injured. And to these three classes may be

added a fourth, viz (4) burns caused by the external application of corrosive substances

- (1) Burns producing mere redness are usually caused by the momen tary application to the part of a hot sold, or of a find at a temperature several degrees below the boiling point of water. They are followed by superficial inflammation with or without desquamation of the cuticle. Burns of this class may be simulated by the application of various raid irritants to the skin.
  - (2) Burns causing vesication are produced by the application of liquids at a temperature about that of boiling water, or by the momentary application to the part of a flam. or of a highly heated solid. Burns of this second class, caused by flame or by highly heated solids, may be accompanied by blackening of the skin and scorching of the hair at the seat of injury. In mild burns of this second class, the vesicles simply dry up and heal, and no permanent marks are left. In severe cases, or in unhealthy subjects, suppuration of the vesicles may occur, follow all by ulcers, leaving permanent cicatrices. Burns of this second class may be simulated by the application to the skin of various strong irritants, eg canthardes and tartar emetic. In badly nourshed persons vesication of the skin, resembling a burn, may occur without the application of heat.\(^1\)
- (3) Burns causing the death of the part injured are produced by prolonged contact with flame or with highly heated solids, or by contact with liquids at a temperature considerably above that of boiling water, eq. boiling oils or melted metals. They vary in appearance and degree of gravity, according to the depth to which the injury extends, e.g. the death of a portion of the skin only may have been caused (Dupuytren s 3rd and 4th degrees) or the underlying soft parts as well as the skin, may be affected (Dupuytren's 5th degree), or an entire limb, bones and all, may be destroyed (Dunuytren & 6th degree) Burns of this class often leave sores difficult to heaf or so large in extent as to require the performance of an amputation They leave permanent cicatrices, which frequently contract considerably causing by their contraction considerable deformity, or impairment of the use of members or joints. If a burn of this class , has been caused by the application of a heated solid, the form of the solid employed may frequently be inferred from the shape of the burn. In burns ' produced by highly heated solids or liquids, the skin, if moist, may be brought into contact for a short time with substances at a high temperature, eg red hot solids or melted metals, without a burn being produced This depends on the assumption of the spheroidal state by the moisture on the surface of the skin, and as a high temperature is necessary for the production of this spheroidal state, the temperature of the substance brought into contact with the skin must be high, otherwise a burn will be produced
- (4) Burns caused by the application of corrosive substances to the body seldom extend deeper than the true skin. Venezation does not accompany burns of this description, and there is no secrebing of the hair; in the neighbourhood of the burn. Turther, if the corrosive substance is, as is commonly the case, a liquid, marks of tricking will usually be found on the eleghes of the person injured. The particular corrosive employed may frequently be inferred from the colour of the marks on the skin, or definitely ascertained by chemical examination of the stained portions of clothing (see "Corrosive Poisson," Chap. XXII)

<sup>1</sup> Guys For Med , p 805

# II -Was the Injury inflicted during Life?

This question sometimes arises, eg in cases where, in order to conceal a murder, an attempt is made to burn the body of the murdered person. The chief appearances whereby burns inflicted during life may be distinguished from post moriem burns are presence of (1) signs of inflammation, (2) a line of redness, and (7) vesication.

- (1) Signs of inflammation and reparative action, such as the presence of granulations or pus on the injured surface indicate that the injury was inflicted some considerable time before death. The absence of such signs of course, does not indicate that the injury was inflicted after death.
- (2) A line of redness—If a burn is inflicted during life, in the great majority of base a line of redness almost immediately forms round the injured surface. This line of redness, although it may be surrounded externally by a blush, disappearing on pressure or after death does not itself distipate on pressure of a line of redness possessing the above characters is almost certain evidence that the burn was inflicted during life, and conclusive evidence that it was inflicted during life, or within ten immutes after death. Its absence however, is not positive evidence that the burn was inflicted after death.
- (3) Vesication—Here it is convenient to distinguish between what may be called respectively true and false vesication. In true vesication the vesicles contain scrum very rich in albumen. In false vesication the vesicles either contain air only, or (especially in dropsical bodies) a small quantity of serum, in which traces only of albumen are present. The presence of true vesication, as the result of a burn, is proof that the injury was inflicted during life. The presence of false vesication, as the result of a burn shows that the injury was inflicted after death. The entire absence of all vesication is quite consistent with the supposition that the burn was inflicted during life, as the fire continuing after death may dry up the vesicles.

#### III -Was the Injury the result of accident self inflicted, or inflicted by another?

Accidental cases are so common that the presumption is always in favour of accident Accidental cases may arise from

an individual's clothes catching fire, or having heated liquid spilt accidentally over him or a petroleum lamp breaks, and its oil catches fire and falls on him Sometimes persons in a state of intoxication fall asleep near a fire and are accidentally burnt to death, and there are also the rare cases of so called spontaneous combustion In the majority of accidental cases, examination of the body throws little or no light on the question whether the injury was or was not the result of accident It may, however be noted that burns on several distinct and separate portions of the body contra indicates accident, whilst the discovery of the burned body at the spot where ignition first took place is consistent with the supposition of accident, if the individual was narcotized or insensible at the time ignition occurred Marks of violence present on the body do not necessarily contra indicate accident Such marks may, for example, be due to injuries received prior to, or at the time of, accidental ignition. It must be borne in mind also that sometimes marks closely resembling wounds are produced as the result of a burn

Suicidal cases are becoming more common as sati in India of late (1917) is becoming more popular

Burns are sometimes self-inflicted in order to support a false charge Where this is suspected, the question whether or no the injuries correspond in appearance to the alleged method of production must be carefully considered (see Case below)

Gas — False charge of burning — "In March, 1865, the assistant magniant of Howards sent me a gril about ten years old, for my opinion as to how certain marks on her checks arms and back were caused. Sile asserted that they were burned with a hot childum (bobacco pupe), whereas the accused declared that they had been made with some paint. I found a large crucial rubown mark, on either check, each of these marks had a clean and perfectly defined edge. The marks on the arms and back were parallel brown sireaks, with clean edges, there was no vesication but the cuticle was beginning to separate buch even, clear edged, symmetrical marks could not have been milited with a healted body upon any person was evaluated to the could rubow that a final mirrant had been applied, and that the case had been trumped up "—Chevers, Rad Jur. p 552

It must be recollected that the application of the actual cautery, or of mozas, or of strong blistering agents, to the body, is a favourite method of treatment among hakims in India, and that false charges may be found on burns so produced The presence also of such burns on a dead body may give rise to an erroneous suspicion as to the cause of death

Homeidal cases, and cases of the infliction of hint by burning are not infrequent in India Chevers mentions a number of cases the means employed be ng in man, of them the application of heritid iron instruments eg sickles or ladles or spoons to the part. In other cases placing the victim over a fire applying a lighted torto or a piece of ignited chaicoil or a heited pipe bowl or pouring, heated oil on the body, or covering a portion of the body with tow or rags steeped in oil and setting fire thereto were the means resorted to

Gase—Homescial scald ng—Several derivats of the Bengal Paper Mills at Banganj attacked a Europian assistant Mr. Honastle and threa him into a hot water tink on the 11th July 1899. The surgeon of Bandwan examined the bold on the morning of the 19th and found bruss on the left site and left shoulder and marks on the throat and needs brusses on the chet and severe brusses on the left as do of the head above the temple. The post worker examination showed an effusion of blood into the thorax. The immediate cause of death was considered to be immersion in the 1 of a ster tank the temperature of which was 1809. Deceased deal minediately sifter numeroon as a result of the extreme, shock. The severe brusse on the head was caused by some blunt instrument and may have caused instead lifty it not leath. The defences the way was that Mr. Ironaste acculately fell in the tank while running away from the nativer with a hom he had quarrelled.

In several of Chevers crees the victims were females, and the burns were inflicted on the pudenda as a punishment for suspected adulter. In others the victims were children the burns being inflicted as a punishment for trifling offences. Chevers also mentions numerous cases of the use by dacouts of torture by fire for the purpose of extorting information from their victims as to the place of concealment of money or valuables and also cases in which there so persons suspected of their have been tortured by lurning as a punishment or in order to extort confession. Again plunging the arm into boiling oil is a form of order! to which womes suspected of witcherfit are subjected in some parts of India. Along with homicial cases may be classed cases where an attempt is made to conceal in murder by burning the body of the murdered person. In such cases nothing but fragments of partially charred bones may be discovered (see Case below).

Case—Supposed attempt to conceal murder by burning the body—
In a case forwarded from Sakkar (Sindh) some fragments of partly
burnt bones were sent for opinion as to whether the same were or were
not fragments of human bones Several of the fragments forwarded were
clearly identified as fragments of the bones of an adult human being A

summary of the history of this case is as follows —Two men started out together, one carrying an axe, after a time one of the two returned the other seemingly having disappeared. Trackers were placed on the trail made by the two men and they on following the trail came to a place where the double trail ended and a return single trail began, at this place the fragments or bone sent for examination were found —Bombay Okemical Analyser's Report for 1883 p.

In other cases the soft part may be more or less entire, and then two questions obviously arise viz (a) Have the burns the character of post mortem or ante mortem burns? and (b) Does examination of the body reveal a cause for death (or for the occurrence of insensibility) irrespective of the burns? The first of these questions has already been discussed (see Quest II) In regard to the second question, the only special point to be noted is, that, as already mentioned, injuries resembling to a certain extent wounds caused by mechanical violence may be produced on a body by the action of heat alone.

## IV —What Results followed, or are likely to follow, from the Injury?

For medico logal purposes in India this question, as in the case of wounds (see p 168) becomes Has the injury caused, or is it likely to cause death, and if not, has it caused one or other of those forms of hurt which are by the law of India designated as 'grievous hurt'? In this regard note—

- 1 Death may occur from burns (1) Before reaction sets in,  $i \, e$  within forty-eight hours of the recept of the injury, from (a) shock or collapse, or (b) coma due to congestion of the brain, and serous effusion into the ventricles (this may be mistaken for opium poison) (2) After reaction has set in, from (b) various internal inflammations, eg pneumonia, bronchitis, pleurisy, enteritis. Enteritis with ulceration, followed by peritourits, is a not infrequent cause of death from burning, especially in young people, (d) surgical complications connected with the injury, eg gargene, erysipelis, tetanus, pysemia, etc., or (e) from exhaustion
- 2 The danger to life in burns depends chiefly on (1) extent of surface injured —Burns involving a great extent of surface are specially dangerous to life "A burn involving two thirds, or even one hill of the entire skin, may be regarded as certain to destroy life, and the same practically may be said.

of a burn (if severe) involving one third of the body "(Indy) deep burns involving a limited portion of the body are not nearly so dangerous to life as burns in olving a wide extent of surface (2) part burnt —Burns on the trunk are more drangerous to life than burns on the extremites, and death before reaction has set in is specially likely to occur in the case of burns involving a wide evertent of surface on the trunk. (3) the doubt of the burn and (4) we of the patient—Children, as a rule lear burns badly, whilst old people ber them comparatively well (Indy). The most fatal period after a burn is the first week. Excisen found that in 54 per cent of fatal cases death occurred within four days and in 66 per cent within eight days after receipt of the nurry.

3 The post mortem signs of death from burns -The soft parts may be entirely destroyed and it may be impossible from the nost mortem appearances to form any opinion as to whether death was due to burning or to some other cause operating before cremation of the body. If the soft parts are more or less entire the post morten appearances present may be External viz marks on the surface of the body, having the characters possessed by burns inflicted during life and varying in appearance according to the length of time which has elapsed between receipt of the injury and death If the body is roasted the limbs are usually contracted | or flexed, be careful therefore in attempting to straighten the limbs as the roasted skin may crack and similar 'wounds may have taken place before your arrival Internal.-Perforating ulcers of the duodenum, resulting from inflammation of Brunner's glands, are common in cases of deaths from burns especially in young children (Curling) Peyer's patches, and the solitary clands generally, are often greatly inflamed and sometimes ulcerated (Idy), (c) Congestion of various organs eg the brain, lungs liver kidneys, etc

In making a post mortem examination in a case of alleged death from burns, it must always be borne in mind that death (or insensibility) may have been produced by causes operating previously to the infliction of the burns. Hence, in cases of alleged death from burning it is extremely important to note (a) Whether or not the burns possess the characters of burns inflicted during life, and (b) whether the examination of the body reveals any cause for the occurrence of death (or meensibility) other than burning, and if wounds are present on the body, to note whether they appear to have been caused by the action of fire or not.

Case - Apparent wounds caused by burning - A boy, at two, was brought to hospital severely burnt and died in three quarters of an hour There were gaping wounds on both knees On the right side, a fissure in the skin commenced about the middle of the thigh, and proceeded for two inches and three quarters to the inside of the patella, or knee pan, where it became somewhat jagged, and making a sudden turn inwards. passed to the extent of two inches towards the back of the joint transverse laceration of the skin, three quarters of an inch in length, was observed on the front of the left thigh, a little above the knee, and another, which was also transverse and measured an inch and a half, was situated below, on the inner side of the joint. These fissures in the charred skin were all about three lines in width and two in depth, and exposed the fatty tissue beneath, which was white, and free from any effusion of blood The edges of these fissures were not uneven, but they did not present the clean and smooth appearance usually observed in incised wounds In several places some small vessels containing blood were observed running across the fissures, these, being more tenacious than the fatty tissue, had not yielded with it From the absence of any trace of effusion of blood the sound condition of the exposed adipose tissue, its exemption from the action of fire, and the irregular character and appearance of the fissures Mr Curling considered them to have been occasioned by the influence of heat -Taylor, Med Jur , p 715

4 'Grievous hurt' may be caused by burns—The injuries which by s 320 of the Indian Penal Code, are designated as 'grievous hurt,' have already been enumerated Burns are especially likely to cause the following forms of 'grievous hurt' -(a) Hurt "uhich endangers life, or which causes the sufferer to be, during the space of twenty days, in severe bodily pain or unable to follow his ordinary pursuits' It has before been noted that burns involving a wide extent of surface (especially of the trunk) are specially dangerous to life (b) If the burns are on the head or face, especially if the true skin is affected to any depth, "permanent disfiguration of the head or face" is likely to result (c) "Permanent privation of the sight of either eye" is a not unfrequent result of the throwing of corrosive fluids, eq oil of vitriol, over the body. (d) "Permanent impairment of the powers of" a "member or joint" is specially likely to occur (from contraction of cicatrices) in the case of severe burns in the neighbourhood of joints

#### Spontaneous Combustion.

The question whether the human body is lable to spontaneous combustion has arisen in the following way—It is well known that in ordinary circumstances long exposure to a high temperature, and the expenditure of a considerable amount of their is required in order to cause any considerable amount of charing of a human body. Several cases, however, are on record where the bodies of persons, generally old obese females addicted to spurits, have been found near a fire or partly humael candle, half consumed, and exhaling a found, empyreumanic odour. In many of these cases, articles near the body have been found

indicating that the temperature of combustion has been comparatively low (see Case, p 251)

In order to start the combustion of an inflammable substance, a portion of it-no matter how small-must be raised to a particular temperature The temperature required varies with the substance A mass of phosphorus will take fire if any portion of it be raised to the comparatively low temperature of 140° F Hydrogen on the other hand, requires a high temperature for its ignition. When a portion of the inflammable substance, or mixture of inflammable substances, is capable of acquiring the temperature necessary for ignition either per se, or on contact with air only, such substance or mixture of substances is hable to catch fire anontaneously. In such substances the self acquirement of the temperature necessary for ignition is the result of the development of heat by chemical action such chemical action taking place either between the substance and the oxygen of the air, or in a few cases, between two of the constituents of a mixture. The principal substances hable to spoutaneous combustion are -

- I Certain simple bodies -I hosphorus is the best known example This substance, in its ordinary condition, oxidizes in air even at a temperature of 50° P, and requires only a comparatively low temperature for ignition, hence, it is peculiarly liable to catch fire spon taneously Certain of the metals if in a finely divided condition, e.g. iron are hable to take fire on exposure to air, owing to heat developed by the combination of the metal with oxygen
- 2 Certain compound bodies take fire at once on exposure to sir, e a silicon hydride liquid phosphide of hydrogen, and zinc ethyl. The presence of a small quantity of the vapour of liquid phosphide of hydrogen also, it may be remarked confers the property of spontaneous inflamma bility on combustible gases
- B Certain mixtures of substances are liable to spontaneous com bustion from -(a) The occurrence of chemical action between the con stituents of the mixture, e.g. phosphorus takes fire on being brought into contact with iodine Many finely divided metals and paper moistened with turpentine take fire in chlorine Turpentine takes fire if mixed with furning mitrie acid, etc. Probably the occasional spontaneous combustion of red fire (a mixture of sulphur carbon antimony sulphide, potassio chlorate, and stroutium intrate) is due to this cause (b) The oxidation of one of the constituents of the mixture -The constituent un lergoing oxidation may be an inorganic substance e q a metallic sulphide bome varieties of coal contain iron pyriks (sulphide of iron) in considerable quantity, and are liable to spontaneous combustion from heat developed by the combination of this with the oxygen of the air Again, the con stituent undergoing exidation may be an organic substance eg a drying oil. Numerous cases are on record of the spontaneous ignition of fibrois and other combustible substances moistened with a drying oil, i.e. an oil capable of drying readily into a resin by taking up ovygen from the sir Cotton, wool hemp flax, jute, woody fibre and lamp black have all I cen known to catch fire spontaneously when moistened with hosced or other Woody fibre moistened with turpentine has been known to eatch fire from a similar action

Organic matters moistened with water only, eg damp hay, cotton, tow, flax, cocoanut fibre, leaves, etc., are hable to become heated from oxidation. Spontaneous ignition of damp has and cotton and of damp oats and esparto grass, has been known to occur. It may also be remarked that certain explosive substances are liable to explode either spontaneously, eg chloride of introgen, or from a very slight amount of percussion or friction, eg mitro glycerine, the metallic fulminates, and mixtures of combustible substances with potassic chloride.

Case -So called 'spontaneous' combustion of the human body -In the Phil Trans, Vol \LIII p 463, it is recorded that "Grace Pett, the wife of a fishmonger at St Clements, Ipswich, used to go downstairs every might, half dressed, to smoke a pipe. On the 9th of April, 1744, she got up from bed as usual Her daughter, who slept with her, did not perceive that her mother was absent till next morning when she awoke boon after this she put on her clothes and, going down into the kitchen, found her mother stretched out on her right side, with her head near the grate The body was extended near the hearth, with the legs on the deal floor, and it had the appearance of a log of wood consumed by a fire without apparent flame. On beholding the spectacle the girl ran in great haste and poured some water over her mother s body, to extinguish The fætid odour and smoke which exhaled from the body almost sufficented some of the neighbours who had hastened to the girl's assist ance The trunk was in some measure incinerated, and resembled a heap of coals covered with white ashes The head, the arms, the legs, and the thighs had also participated in the burning. This woman it is said, had drunk a large quantity of sparituous liquor, in consequence of being overloved to hear that one of her daughters had returned from Gibraltar There was no fire in the crate, and the candle had burnt entirely out in the socket of the candlestick which was close to her There were also found near the consumed body the clothes of a child and a paper screen. which had sustained no injury Herdress consisted of a cotton gown -Woodman and Tidy For Wel p 1010

Case - Spontaneous combustion put forward as a defence to a charge of murder ' In March, 1850 a man named Stauff was tried at Darm stadt for the murder of the Counters of Garristz He had assaulted the deceased in her chamber and then set fire to the furniture, with a view to conceal his crime The body and dress were partially consumed the means by which the fire was applied were not at once apparent, and the assassin had locked the doors of the room, some medical men took up the theory that the deceased had died from spontaneous combustion The facts of the case were referred to Professors Liebig and Bischoff, of Giessen, and their report was issued in March, 1850, at which date the man Stauff was put on his trial They found no difficulty in concluding that a murder had been perpetrated, and the body wilfully burnt after death, for the purpose of concealing the crime Stauff was convicted. and subsequently confessed that he had strongled the countess, and then, heaping articles of furniture around the body, had set fire to them, with the object of concealing the murder -Taylor, Manual, p 348

# Death from HEAT.

SUNSTROKE INSOLATION, 'COUP DE SOLEIL,' HEAT-APOPLEXY

Death from heat seldom becomes the subject of medico-legal inquiry except in cases of sudden death in heated engine rooms or factories or cases found dead in railway carriages, where there is suspicion of foul play

#### Death from heat may occur in two ways -

- (1) Heat Exhaustion, sudden syncope or faintness from exposure to high and usually moist\_temperature\_of\_the\_air Patient suddenly feels faint, turns pile, pulse is weat, soft and fluttering respiration shallow, skin cold, temperature sub normal
- (2) Heat-Stroke or Sun-Stroke, usually by exposure to intense sun heat. The symptoms may set in suddenly, or there may be primentory symptoms such as headache and comiting. These are followed usually by confusion of vision, flushing of the face, conjunctive congested and stuper or coma. The temperature is invariably high. The pupils are generally dilated in the earlier, and contracted to a fine point in the latter, stages. In a few cases delirium and convulsions are present. Death has been known to occur via five minutes, or as late as three days after the commencement of the attack.

Circumstances modifying the effect on the system of exposure to heat

- 1 Mosture present in the atmosphere Other things being equal the less this is the better exposure to hack is borned. They presence of a large amount of mosture in the atmosphere interfers with vario formation the surface of the body, and favours the action of heat on the system.
- 2 Duration of exposure —Very high temperatures can be borne for a short time but not for long without ill effects. Chabert, "the Tre hing was in the labit of entering an oven the temperature of which was from 400° to 600° P.
- 3 Habit.—This appears to a certain extent to lessen the effect of exposure to heat Individuals accustomed to earry on their daily work in an atmosphere of high temperature apparently withstand the action of heat better than others.
- 4 Bodily conducts of individual—The action of held on the systet an about the variety of the system and the conduction of the system and the checks elimination or criti transact the normal working of the organic system. In 90 per cent of cases of Heat Stroke personally examined in Eastern Bengal and Bombar Powell has found evidence of (1) makina (2) alcoholic excess or (3) applitus sometimes all three in the some case.

Post morters appearances —Lu some cases no admirated appearance has been present. In the majority of cases, congestion of the brain and its membranes, engorgement of the right side of the heart and congestion of the lungs and abdominal viscers are found. The blood is frequently fluid and drik in colour, hence there is great post-mortem lividity and decomposition sets in rapidly.

#### Death from COLD.

If, from exposure to cold, the temperature of the human body becomes reduced for any length of time much below the normal, death occurs. In exceptional cases the temperature of the body has been known to fall as low as 79°, or even 75°  $\Gamma$ , without life, being extinguished

Constitutional symptoms produced by exposure to cold are depression of the heart action and toppor succeeded by stupor or coma, from congestion of the nervous centres. In addition, exposure to cold may produce certain local efficts e g chiblians or, meser cases, frost but the part afficted becoming when frost butten, bloodless ach grey, and insensible II a part affected with frost butten bloodless ach grey, and insensible II a part affected with frost butte is warmed too suideding, gargene is apt to set in lunce, warmth should be restored to frost butten privat gradually, as, for example, by friction with snow

Circumstances modifying the action on the system of exposure to cold

- 1 Wind—Air being a bad conductor of heat, cold still air produces much less barmful effect on the body than cold air in motion, as in a wind
- 2 Mosture If the surface of the body be wet, or covered with wet clothing and exposed to cold air heat, owing to evaporation, is with drawn more rapidly than if the surface of the body be dry
- B Duration of exposure —Of course the longer the exposure to cold, the more likely are ill effects to occur Adopting proper precautions how ever, an extremely low atmospheric temperature may, as in the case of arctic voyagers, be borne for long periods
  - 4 Age -Adults bear cold better than the very young and very old
- 5 Bodily condition—The action of cold on the system is favoured by anything which tends to lower the vital powers eg fatigue, exhaustion, intoxication, want of food, etc.

Post mortem appearances are not very characteristic, they are, according to Ogston—(a) Attenda hue of blood generally, except when viewed in mass within the heart (b) Unusual accumulation of blood on both sides of the heart and in the large thoracco attences and vense (c) Irregular diffused dusky red patches on limited portions of the surface of the body, even in the non dependent parts (d, Pallfor of the surface of the body, accompanied, according to Ogston, with ausmina, but, according to other authorities, with congestion of the viscera most largely supplied with blood Ogston, however, found moderate congestion of the beam in three, and of the liver in seven, out of stateen cases.

Death from cold is as a rule, accidental, as in drunkards falling asleep in the snow or people lost in snowdrits Exposure to cold is a common method of infanticide in temperate climates, death taking place rapidly Cases where insane persons have, it is alleged, been killed by exposure to cold, sometimes form the subject of a medico legal inquiry Taylor mentions a case where the death of a lunatic appears to have occurred from the combined effect of a shower bath at 45° I' for half an hour, followed by a full dose of tartar emetic

## Death from LIGHTNING and ELECTRICITY.

Death by lightning with marks of violence on the body which have been attributed to murder sometimes require medico legal investigation

The human body is a feeble conductor of electricity, it allows of the passage through it, by conduction, of charges of electricity up to a certain pitch of intensity, but if this be exceeded, discharge taking place through the body becomes of the nature of a durupture descharge. The passage of a feeble charge of electricity by conduction through the body usually produces no ill effects. A strong charge—strong enough to kill by shock—may pass through the body by conduction, or at any rate without producing visible septration of its particles, hone, in some cases of death from discharge of electricity, no wounds can be discovered Very strong charges of electricity discharging through the body usually produce visible wounds. Heat may be evidenced by the skin or clothes showing marks of burning metal articles attached to the oldnes such as butlons, or carried in the pockets show signs of fusion, and steel articles, a kind for evample, are found to have acquired imagnetism

Conditions of lightning stroke -- Lightning stroke has occurred in almost every situation. Thus persons have been struck by lightming in the open, in houses (in one case a boy in bed was struck by lightning), under trees etc. etc. Not infrequently, of two or three persons standing near one another one is struck, the others escaping. During a thunderstorm the neighbourhood of a high projecting bad or feeble conductor, such as a solitary true is a specially dangerous situation. The projecting object attracts the accumulated electricity but, being a bad or feeble confluctor opposes such resistance to its passage that lateral discharge takes place into neighbouring objects eg into the body of an individual standing near The neighbourhood of a good conductor, if of insufficient thickness is dangerous for a precisely similar reason. Telegraph clerks. for example, have during thunderstorms, been killed while standing at their instruments, owing to the wires in connection therewith, from their insufficient thickness, opposing so much resistance as to cause lateral discharge. The attraction of projecting objects for electricity necessitates the protection of high buildings by lightning conductors. These are thick rods of copper, one end of which projects above the building while the other is buried in wet earth. All metal work on the surface of the building should be in electrical connection with the light ning conductor by thick wires A peculiar class of cases of death result ing from the discharge of atmospheric electricity are the cases in which individuals are killed by what is called the return shock' In these cases the person killed is sometimes at a considerable distance from the spot where the discharge of lightning takes place. Cases of this kind are explained as follows A cloud charged with electricity induces a charge of the opposite kind in objects—e.g the bodies of individuals—in its neighbourhood When the cloud discharges itself, the inducing influence being suddenly withdrawn, these objects suddenly discharge

their induced charge of electricity Sometimes this discharge of induced electricity from the body of an individual is so violent as to produce a severe or even fatal shock In cases of this kind no marks of injury are found on the body of the sufferer

Death or injury from electricity other than atmospheric electricity -This is usually by accident Powerful 'are' electric lamps (i e lamps in which the light is produced by disruptive discharge between carbon terminals), require currents of great intensity Two or three cases have lately been recorded where individuals have been killed by accidentally short circuiting such currents through their bodies eq by grasping the wires conveying the current one in either hand, or by standing on one wire and laying hold of the other, or passers by near leaks at broken wires on the electric tramway lines in Calcutta and other cities ' Plectrocuting is the judicial form of execution in the United States of America and some other countries in place of the time honoured method of hanging

The effects produced on the body by the passage through it of an electrical discharge may be-(1) Local, (2) Constitutional

Local effects produced may be burns, blisters or wounds, or egchy mosed streaks spots or patches Burns and blisters are sometimes the result of the clothes having caught fire, but may occur independently of any ignition of the clothes. The hair is often found singed. If a wound is found it may be lacerated punctured or contused in character. Ecchy mosed or hvid patches spots or streaks are frequently met with Some times the streaks present a peculiar arborescent appearance Fractures are rare, but have been found in a few cases (Tidy) No marks whatever may be found on the body even in fatal cases in which the clothes have been burned

(2) Constitutional effects produced may be immediate death from shock, or the individual may fall down insensible and die after an interval varying from a few minutes to several days. In one case death occurred as late as the thirty third day after the receipt of the injury If immediate death is not caused, the probabilities appear to be in favour of recovery taking place. In non-fatal cases various nervous affections have been found eg paralysis (hemiplegia or paraplegia), loss of sight hearing speech or memory, or there may be no apparent effect beyond the momentary shock if the current is slight

## Signs of death or injury from electricity may be -

- 1 External marks on body -The nature of these has been already described The livid arborescent streaks found on the boly in some cases are peculiarly characteristic of death from lightning strole. The marks present on the body may similate in appearance marks of mechanical violence
- 2 Internal appearances -- Injury to the brain or its membranes is frequently found. The membranes may be congested or lacerated brain may be congested or disorganized Blood may be found effused on the surface or into the interior of the brain
- 3 Objects on or near the body may show signs of the passage of electric discharge The clothes may be found burnt or torn, the boots have sometimes been found burst open. In one case the whole of a man a

clothes were toru off his body and scattered about. Metal articles attached to the clothes or carried in the pocket may be found used, and steel articles may be found to have become magnetic. Objects in the neighbourhood of the body max be found to show agene of mayir, eg a wall or building may be found enacked, or shattered and thrown down Trees may be found enacked, or shattered and thrown down Trees may be found spike, and combustible objects, sepecially if dry, may

be set on fire or show marks of burning
Rigor mortis sets in rapidly and putrefaction may be hastened

#### CHAPTER IX

#### DEATH FROM STARVATION.

ACUTE and chronic strivition through deprivation of food have similar symptoms. In acute staryation death takes place usually in ten to twelve days, accompanied by mania and convulsions

The essential nutritive constituents of food are (1) Albummates, (2) Carbohydrates, (3) hats, and (4) Salts. In order to maintain health and strength, a certain amount of each of these plus a certain amount of water, must be duly supplied. Of the essential nutritive constituents of tool the albummates, e q albumen and casem, contain both carbon and nitrogen. The carbohydrates, e q starch and sugar, contain evition but no introgen. The fats like the carbohydrates, contain no nitrogen, they, however, contain a larger percentage of carbon than the carbohydrates For convenence, we may call the nitrogen contained in albummates nutritive nitrogen, and the carbon contained in albummates carbohydrates and fats nutritive carbon.

The daily food requirements depend (e) on the weight (in health) of the midvalual to be fed. (b) on the amount of work performed, and (c) on the age of the individual (children require more food in proportion to their weight than adults seeing that in their case growth as well as nutrition must be provided for). An adult requires daily if at rest 25 grains, or if at work about 30 to 45 or 50 grains caccording to the amount of work done) of nutritive earbon per I Ib of body weight. With a samount of carbon, nutritive introgen must be supplied in amount equal to one fits entil to one twentieth of the weight of the carbon. The food must contain a data was the moment, e.g. phosphates, required for the nutrition of the body, also a certain amount of phosphates, required for the nutrition of the body, also a certain amount of common sail, say \(\frac{1}{2}\) to \(\frac{1}{2}\) of the carbon and condiments. The food should be varied in character, of good quality, and condiments. The food should be varied in character, of good quality, properly cooked, and the intervals between meals should not be tool only.

A rough rule for calculating the daily food requirements of adult natives of India is as follows—Given (a) that the food consists solely of cereals and pulses fairly free from husk, and that the dictary contains a sufficiency of fat, and (b) that the amount of nutritive introgen in the dictary equals about one-twentieth of the carbon, then the number of omness of food daily supplied must be not less than the average body weight in pounds of the individuals to be fed, multiplied by —For bare work of the carbon, the control of the product of the carbon, then the number of owners of the individuals to be fed, multiplied by —For bare weight in pounds of the individuals to be fed, multiplied by —For bare downers of the carbon of the carbon of the carbon of the product of the carbon of the carbo

Rapidity with which ill-effects follow deficient supply of nourishment is affected by—

- Age -Old persons bear deprivation of food better than adults, and adults bear it better than children
- 2 Condition of body Fat people hear deprivation of food best Diminished activity of the vital functions (as in catalensy) delays the occurrence of ill effects from derivation of food
- 8 Exposure to cold—Where the loss of heat from the surface of the body is rapid, the effects resulting from a deficient supply of the matters (food) required to maintain the normal temperature are more quickly felt than when the loss of heat from the surface is slow
- 4 Depression of water—Complete abstances from both food and water kills more rapidly than abstances from food alone Taylor! states that it is probable, that in a healthy person under perfect abstances (from both water and food), death would not commonly take place in a shorter period than a week or ten days Guy² mentions a case of shapwared where, of eighteen persons deprived of lood and water, only one surviyed the eighteen that on the provided and water, only one surviyed the eighteen that of the provided in the provided of the pro

#### Symptoms of starvation -The chief -

1 Emacation, loss of weight.—The subcutaneous fat disappears and the muscles waste, so that the skin of the face becomes wrinkled, and that of the body especially in previously plump persons, becomes beggy Chossat, from a series of experiments on animals found, as a rule, death to occur when the animal laid bot two fifths of its weight. Observation seems to indicate that this rule holds fairly good in the case of human beings.

#### 2 Exhaustion and weakening of voice

- 3 Pallor and cadaverous look,
- 4 Thirst pain and irritation of the stomach and usually a costive condition of the bowels. The outlets of the body are frequently found inflamed.
- 5 Pulse is at first quickened, but subsequently becomes slow. It usually, however, becomes greatly quickened on the approach of danger—Tidy.
- anamy, nowever, becomes greatly quekened on the approach of danger—Tidy

  6 In chronic cases especially, the skin frequently becomes covered
  with 'a brown filthy looking coating' and the body emits a fottle
  door "The gums become swollen and ulcerated, and there is great
- tendency to ulceration and sloughing on the receipt of slight injuries'—
  Cornish
  7 Wild looking eyes, delirium and convulsions in some casts precede ,
  death, in other cases the mind remains unaffected

Post mortem appearances—These are chiefly great emaciation, a shrunken and contracted condition of the stomach and intestines with pale pearly and translucent coats, a more or less atrophied condition of

<sup>1</sup> Med Jur II 189

<sup>\*</sup> For. Med , p 812

the viscera, and absence—not necessarily complete in acute cases (see Case below)—of tat. It should be noted, however, that all these appear ances may be present in death from exhausting diseases. Hence in cases of death from alleged homediad startation, the body should be carefully examined for appearances indicating the existence of such diseases. If may, in such cases, be an extremely difficult imatter to form a definite opinion as to whether death was due to disease or startation (for a case in which this question arose, see below).

Case - Prolonged sleep with starvation - A man of healthy habits. 43 years of age, was at intervals subject to attacks of long and persistent sleep He would retire to bed at his usual hour, and without any warning symptoms, suddenly and almost immediately fall into a profound sleep. from which all the usual means would fail to arouse him In this state his face and ears were pale, the skin was pale, and generally warm, but his feet were cold and livid, and the limbs quite relaxed. His pulse was soft, slow, and feeble his respirations almost imperceptible, about eight or nine in a minute He appeared like a person in a refreshing, tranquil slumber There was no stertor or snoring. The longest period he ever passed in profound sleep was five days and five nights. He frequently slept three days, and occasionally four days, without waking but his average period was two days. His secretions were suppressed, and no food was required. He commonly awoke suddenly, had no consciousness of the lapse of time and retained a good remembrance of the last occurrences before he fell into this state. He had no dreams -Taylor, Med Jur. I 48

. Case —Homicald starvation.—Death from disease set up as a defence —Deceased, Harrie Stautton, had been kept in clove confinement by the accused She was seen a few hours before her death, by a medical man, and was then insensible and collapsed. She dead in a state of complete exhaustion On post mortem examination appearances indicative of death from starvation were found the body weight being only 74 lbs instead of about 120 lbs, as it would have been in a healthy adult of the same age The following post mortem appearances of disease were present —(1) A slight tuberoular deposit at the apex of the left ling (2) A congested appearance of the cardiac extremity of the stormach, as well on the stormach of the cardiac starting of the stormach, as well on the stormach of the cardiac starting of the stormach, as well on the stormach of the stormach, as well on the stormach of the stormac

Starvation may be accidental, homicidal, or suicidal— The most common causes of accidental strivation aro— (1) Shipwreek, (2) Mining accidents—individuals by a fill of earth getting shut up in a mine, (3) Disease, eg stricture of the exophagus, and (4) Famine

In Homicidal cases the victim is usually an infant or child. The withholding of food, with or without exposure to cold, is a not infrequent method of infanticide (see 'Infanticide') Cases also are not infrequent where children have been starved by their parents or other persons having charge of them,—'baby farmers' In fatal cases of this kind as already pointed out, the body should be carefully examined for signs of disease, especially chronic wasting disease. In non fatal cases, an unusually low body-neight coupled with a rapid gini in weight when proper nourishment is administered, is very strong evidence in favour of starvation (see Case below). As already pointed out under Sufficiation in one form of samadak or burial alive of lepers the head is left uncovered and death takes place from exhaustion the result of starvation and exposure, and not —as in cases where the burial is complete—from sufficiation Suicidal cases are rare but are sometimes met with, especially in the insane and prisoners who sometimes attempt to commit sounded by starving themselves.

Can — Sharvaton , rapid can of weight unlier proper feeding.— Prisoner charged with starting his servant et 13 years. The grid weighed thirty five pounds. She suffered in the cold weather from chilbanas and sloughing of the toes. When removel and properly fed she recovered her health an I guined weight at the rate of five ounces per deem for 129 4 yes.—Tayl Leg Met 1 P 903. Lancet August 11 1830.

Gave—Manshaphter by stavaton in charlatan s "cure."—4t Worthing in 1920 L. V. H. a single woman aged 6d deed under a 'cure by a cure specialist. W Aird and a nurse in which the 'cure consisted of an exclusive died of a with a died with the body was in a state of complete emacistion and the post energial showed that death was due to acite pneumonia super-single on drompt aboved that death was due to acite pneumonia super-single on charge and returned a verdict of manchapther against the 'cure specialist and nurse—D till Express (Lond.) May 27 1090

Pretended fasting.—Cases are on record where individuals as a rule hysterical girls or young women have pretended to an ability to abstain for long periods from food. A medical man should in such cases be cautions about undertaking the duty of watching the impostor with a view to detection as if death risults he may be held criminally responsible. In the case of the Welsh firsting furl the medical men who had accepted the responsibility of superintending the watching were indicate before the magistrates along with the parents of the girl, the parents only however, were committed for trial

# SEXUAL CRIMF'S AND OFFINCES AND RELATIONSHIPS

Sexual crimes and offences and relationships may consensently be classed under the heads of (1) Impotence and Sterility,

(2) Virginity and Defloration, (3) Pregnancy and Legitimacy (4) Birth and Delivery to Inheritance, (5) Rape,

(6) Abortion and Faticude, (7) Criminal Infanticide, and (8) Unnatural Sexual Crimes The means of identifying sex

in doubtful cases has already been considered (pp 35, etc)

## CHAPTER X

## IMPOTENCE AND STERILITY.

SEXUAL capacity is a question that may arise with reference to marriage, charges of rape, etc

Marriage according to the law of England, is a contract which may be declared null and void by the court on proof that either of the parties thereto is incapable of fulfilling its terms is of consummating the marriage. Hence a suit for the declaration of nullity of marriage may be brought by one of the parties to the contract on the ground that the other is impotent or incapable of sexual intercourse. To obtain a decree declaring the marriage null and void on this ground it must, however, be proved (a) that the incapacity existed at the time of the murriage, and (b) that it is of such a nature as to be incurable, or only curable by an operation to which the individual relieses to submit (see Case, p. 264). A marriage may also be declared null and void on the ground of insanity of one of the parties thereto at the time of the marriage (see Insanity'), and a 'breach of promise of marriage is justified in law by the discovery that the woman is suffering from 'thererolesis (see Case below)

Case — Disease and breach of promise — 'If a man knows that a woman is suffering from tuberculosis he is justified in breaking off his

engagement to marry her. This ruling was made by Mr Justice Lush in the hing's Bench Division in an action for breach of promise by Miss M P against Mr G B, the sen of a doctor at Newport, Monmouth — Dail Fapress (Lond.) April 6, 1919

'Impotence' is the incapacity for performing the sexual act and 'sterility' may exist in either sex, but the existence of one of these conditions does not necessarily imply the existence of the other, eq an individual may be sterile, but not impotent. or impotent, but not sterile Sterility by itself offers no legal ground for a divorce while impotence may do so In practice the two disabilities resolve into impotence in the male and sterility in the female The question of the impotence of an individual may arise in (1) nullity of marriage suits. (2) rape cases where impotence may be pleaded as a defence by the accused (see 'Rape,' Chap \IV ), and similarly, in other cases impotence may be set up as an answer to a charge of adultery. (3) cases of disputed right to inherit (see this subject) where an individual is alleged to be an illegitimate, or a supposititious child-here both Sterility and Impotence come in also in (4) cases where, under certain circumstances a woman seeks to have absolute control given to her over money, on the ground that she has no children and is past the age of child bearing

Recorded instances of capubility of reproduction in very advanced life are Cato the censor, who is said to have had a son at eighty years of age, Zadissās king of Poland, at the age of ninety married his second wife and had two sons. As a fact

spermatozon can often be detected in the testicles of very old men. Duplay discovered them in nine octogenarians

#### In the male.

A male may be impotent or sterile or both, owing to (1) extreme youth (2) advanced age, (3) malformation or defect, (4) disease, (5) mental causes, (6) drugs

(1) Extreme youth.—According to the law of England, the carbest age at which a male can contract a valid marrage to fourtoen, and a male nader the eye of fourtoen is held incapable of committing a rape. It appears, therefore, to be a presumption of English law that a by does not struin puberty and become jotent for cottus until he has reched the age of fourteen. The law of India contians no similar presumption, a boy under the age of seven is (I P Code, s S2) held to be macapable of committing rape or any other offence. Over that

age, the question of his capacity to commit rape is a question left to the courts to decide according to the evidence produced in the case. The age at which males attain puberty, and become soon capable of performing sexual intercourse, varies The general age among Europeans is probably about fourteen, and among natives of India somewhat earlier. In exceptional cases puberty is attained at a very early age. Tidy mentions a case of a boy who was given to masturbation from the age of three, and of another boy aged four and a half, who attempted intercourse with his sister aged two 1 In other cases puberty is not attained until a comparatively late age. Taylor mentions a case of a man whose pents and testicles at the age of twentysix "but little exceeded in size those of a youth of eight years of age" This individual married, became the fither of a family, and at the age of twenty eight the organs became fully developed 2

Attainment of puberty and potency does not, however, necessarily imply coincident attainment of fertility. Until spermatozoa appear in the seminal fluid, an individual is sterile \ (and ceases earlier) than the capacity for coitus Casper considers that the power of procreation commences later Taylor gives ! fourteen as the earliest age at which the procreative power has been recorded to appear in the male a Aspermatism can be detected by the microscope

- (2) Advanced age may of course be a cause of impotence or sterility in the male Cases, however, are recorded of the procreation of children by men of seventy-one, eighty-one, and ninety two, and spermatozoa have in several cases been found in the seminal fluid (indicating fertility) of men over ninety 4 Casper once found them in a man aged ninety six 5 In English law there is no age from fourteen upwards at which a man is denied the power of procreating children
- (3) Malformation or defect.-Impregnation may result from the mere deposition of semen within the vulva 6 No malformation or defect of the penis, therefore, can be regarded as an undoubted cause of impotence, unless it is of such a nature as to completely prevent such deposition. This being so, impotence results from complete loss or absence of the penis, or from its orifice being situated, as in complete hypospadias or epispadias, in such a position that deposition of

<sup>&#</sup>x27; Tidy, Leg Med , II p 77 ' Ibid p 285 ' Caspor II pp 258 291

<sup>\*</sup> Taylor Med Jur II p 290

Ibid p 291 Tidy, Leg Mel II p 14

seemen within the vulva during contus is impossible. Impotence has thus resulted from perional fistula. For the reason above mentioned, impotence is not necessarily the result of partial thereic or loss of the penus, or of partial hypospadias or jenispadias. Adhesion of the penus to the scrottum or abdomen! may cause impotence remediable by a slight operation. Individuals impotent from malformation or defect of the penus are not necessarily storile it being possible to effect impregnation by artificial injection of the seminal fluid.

Loss of both testicles, or absence of both testicles, of correct no lives impotence and sterility. The power of procreation may however remain for a limited period after the removal of both testicles, owing to presence of accumulated seminal fluid in the vesiculae seminales. Loss of one testicle only does not result in impotence nor are those who have one testicle only (monorchids) impotent (see Case below). Individuals in whom the testicles have not descended (cryptorchids) are not necessarily impotent, many, but not all, are, however, sterile (see Cases below, and over page)

Case.—A nullity of marriage case.—In the case of  $L \times L$ , it appeared that the woman was impotent but that she might possibly be cared by an operation involving no great risk of life to which, however, she refused to submit. The court in graining the decree, said that it could not compel her to submit and the iman can only be expected to take all reasonable means to persuade her. This he has done and she last distinctly returned  $(L \times R) = 10^{-1} \, \text{M} \cdot \text{M} \cdot \text{M} \cdot \text{M}^{-1} \, \text{M} \cdot \text{M}^{-1} \, \text{M} \cdot \text{M}^{-1} \, \text{M} \cdot \text{M}^{-1} \, \text{M}^{-1} \, \text{M} \cdot \text{M}^{-1} \, \text{M}^{$ 

Case—Procreation by cryptorchid.—A man in whom the testicles had not descended at the age of 30 had been twice married and had had children by each wile besides illegitimate children which were afhilated on him during the time he lived in service—Taylor Med Jur, II p 288

Case—A similar case—Case of a man in whom the testicles had not descended reported by Vir Polaci. This man married when he was 20 had too children by his first wife and at the time of his admission into hospital (for hernia) had been married two years to a second wife—Ilad.

Case—Procreation by a monorchid.— Willimet the first wife of one John Burv alleged that he was impotent and on inspection by two physicians he was found to have but one testicle, the size of a small bean while she was a rirgin. On this and other circumstantial endence the Eachedonked Courd annulled the marging. Mark Burylands a second wife, by whom he had a son —Case of John Burr, temp Queen Elizabeth, Gur, For Mel P. 48

(4) Disease,—Local disease may cruse temporary and remediable impotence, eg elephanitasis and large hydrocele from mechanical obstacle to cotton, and structure of the

ureth, from mechanical obstruction to the flow of semen Local disease may also cause perminent and incurable sterility, of advanced disease of the testicles, or wasting of the testicles after inflammation, this last has been observed as a result of motastatic parotitis. Lithotomy has been known to cause isterility, probably from injury to the ejaculatory ducts

Constitutional diseases, if of an exhausting nature may produce temporary impotence, but general diseases, not affecting the brain or spinal cord or not producing great debility, do not usually cause impotence 1 Injury or disease of the brain or spinal cord may cause impotence or sterility Curling relates several cases of impotence caused by blows on the head, especially on the back and under part of it, in some cases of this class recovery takes place but in others wasting of the testicles and permanent sterility follows 2 Paraplegia from injury to or disease of the cord according to Curling (and probably also locomotor ataxy) has no direct effect on the testicles, but may cause impotence by destroying the power to copulate Wasting of the testicles and sterility may, however, follow In one case quoted by Curling a man suffering from paraplegia of some years' duration retained sufficient sexual power to have prohific intercourse. Hemiplegia may cause impotence but Guy mentions two cases where men within three weeks of an attack of hemiplegia had sexual inter course with their wives and begat children's (see Case below) Over indulgence in certain intoxicating or narcotic drugs eq alcohol, opium cannabis, and tobacco is said to cause sterility Sterility has by some men been stated to occur in chronic lead poisoning

Case—Bagot v Bagot (Irish Probate Court 1878) Dr Radcliffe stated that he himself has seen cases of atavy in which sexual capacity and fruitfulness were retained—Guy, I or Med., p 49

Gase—Procreation after an attack of hemiplegia —  $\mathbb E$  h,  $\operatorname{st}$  5 dwine 33 years of age had a well marked attack of hemiplegia of the right side which has left him lame, and with his speech slightly affected He alleges that he had connection with his wife within a week of his servure that his sexual powers have not been impaired and that since his attack he has had three children always considered as his sown His wife gives three weeks as the extreme limit of time after the attack at which connection jook place —Guy,  $For\ Wed$ , p 50

(5) Mental causes —Excess of passion timidity, fear, etc, may cause temporary impotence Individuals may, it is

<sup>&</sup>lt;sup>1</sup> Taylor Mel Jour, II p 292 <sup>2</sup> For Med p 49

alleged, be impotent or sterile as regards a particular female, but not as regards others (see Cases below)

Guer—Alleged impotence in respect to one female, but not to others—"In the reign of lung James I of England, the Earl of Faser was said by his Countess for divorce on the ground that he was unpotent. She claimed to be a rayo nutated, but is said to have substituted one of her mails for herself when examined. The I arl appears to have admitted the charge as regards the Countess although the demost a quoted other—Woodman and Trdy For Med., p 670 from Hargraves State Triats, I p 315

(6) Drugs — Diuretics carbonate of soda, etc., have a marked anaphrodisiac action — Quinine, by causing emissions has a reputation for tending to impotence.

## Sterility in the Female.

- A female may be sterile owing to (1) extreme youth, (2) advanced age. (3) malformation or defect. (4) disease
- (1) Extreme youth—According to the law of England twelve is the earliest age at which a female can contract a valid marrage, it would therefore appear that the law of England presumes that a girl attains puberty and becomes potent at the age of twelve, though she cannot give her consent to the sexual act till she is sixteen years of age Age of Consent in India—According to the law of India (P Code, s 375) any female over the age of twelve crin give a valid consent to sexual intercourse, and sexual intercourse by a man with his own wife the wife not being under tygle years of age is not ripe. Hence it would appear that the law of India presumes that a female attains puberty and becomes protent at the are of twelve.

Commencement of Ferthity is as a rule, indicated by the commencement of menstruation. In a few cases, however, pregnancy has occurred before the appearance of menstruation but no case of pregnancy at an earlier age than eight to much has been recorded. Menstruation is not a sign of bodily naturity, it is in most cases merely a ging of puberty and "ovidation," with possible a pregnability on capturity to consider

The age at which the menstrual function becomes estab listed varies gracily with the individual and climate. Among natives of Europe the general age at which it first appears is fourteen to fifteen. Out of 2000 cases, menstruction appeared in 211 between the area of ten and twelve, in 1462 between

thirteen and sixteen and in 318 between seventeen and twenty. In one case only did it uppeur as cirly as nine, and in one only as late as twenty two. Among natives of warm climates menstruation occurs earlier than among natives of temperate climates. Among natives of India menstruation so early as ten is uncommon but its appearance is seldom delayed beyond the fifteenth year. The menstrual flow commonly lasts three to four and a half days. The menstrual period reckoned from commencement of flow to commencement of flow, save in exceptional cases is twenty eight days.

The influence of Tropical Climate in causing early mention that are given the comparative results of observations at Calcutta in 3189 cress amongst European Eurasian, and Indian born girls as to the age at which mentiruation first appeared. In the class of pure native Hindus and Moham medans but chiefly the former the greatest percentage of dates for first menstration occurs between the 12th and 14th years, amounting to 65 7 of the whole class. Eurasians approach the native type between the ages of 12 to 14 years but diverge again towards the Furopean type between 14 to 16 years of age

AGES OF FIRST MENSTRUATION IN INDIA IN YEARS

		16-11	11 12	12-13	13 14	16 15	15 16	16-17	17 18	18-19
Lace		ler cent	Per ce t	Per cent	ler cent	Per cr. t.	Per cept.	Per cent.	Per cent	Per cent
Luropeans	174	27	61	13 4	23 4	21 2	167	8.8	61	16
European country born Eurasians Natives Jewesses Chinese	897 795 1752 73 8	07 07 20 -	3 6 0-2 10 4 2 7	10 8 22 0 86 4 9 5 12 5		24 8 22 0 13 9 34 2 12 5	10 5 4 5	19 4 4 9 2 2 1 3 12 5	81 17 02 13	1 2 0 6 0 04 —
Total	3189	-	1 -	-	-	J -	_	_	-	-

The cause of the earlier menstruation in hot climates seems, partly due to the shorter duration of life with its consequent earlier maturity and partly to the social differences whereby in the tropics children early gain precocous knowledge of sexual matters, owing to the want of privacy in oriental domestic life. Thus an experienced observer states that it is doubtful if there are any little boys and girls in native houses

in this country who have reached the age of ten jears who do not have a very fur knowledge of what the sexual relations and child bearing really mean 'I in addition, there is the precocoous evial excitement of too early marriages at the age of ten to twelve years with its many jessibilities of sexual intercourse authorized by native customs though now made allegal by Intrish law

(2) Advanced age and Cessation of Menstruation—Menstruation usually ceases between the ages of forty and fifty, but has been known to cease as early as twenty-three. On the other hand there are on record several cases of menstruation at over sixty years of age and one as laton as severily seven 'As a rule fertility ceases with the cessation of menstruation but Taylor' mentions a case of a lady aged forty four who was delivered of her tenth child eighteen months after the entire cessation of the mension. No general rule can be laid down as to the age at which in the female fertility ceases.

The question whether a woman is past child bearing is of practical importance in cases where money has been settled on or bequethed to a woman absolutely in cras she has no children but in case of having children only for her life with remainder to her children. In these and similar cases where the woman has attained an advanced age without having had children it is prasumed she is incapable of having issue and she is held absolutely entitled to the money in which, if she ha ichildren she would only have a life interest. No particular age is fived as the period when such presumption arises

(3) Malformation or defect.—Complete absence or occlusion of the vagina of course causes impotence Occlusion may

be remediable by operation Tor occlusion to act as a cause sternlity it must be complete, "the slightest aperture will often suffice for impregnation" Many cases are recorded where during labour the vagin has been found occluded to so great an extent as to require incision in order to effect delivery. Ogston mentions a case of "a woman who had a vagina so narrow as scarcely to admit a quill," but who, after being married eleven years, became pregnant, when the vagin "dilated of itself sufficiently to admit of delivery at the full term" Absence of the oviries or uterus of course cause ancurable sterility. In such cases, however, there may be no external defect or malformation, and the cause of the sterility may in consequence only be ascertainable after death

(4) Disease—Impotence or sterility in the female may arise from a variety of diseased conditions. There may, for evample, be excessive irritability of the vagina, preventing cottus and causing impotence (see · Cases below). Again, or fecto-vaginal fistula. Sterility may result from disease of the ovaries, obstruction of the Fallopian tubes, or of the neck of the uterus, displacements of the uterus, etc. etc. Acid discharges from the vagina or uterus may cause sterility by acting destructively on the spermatozoa, or preventing their access to the ovum. Paraplegia in the female, it may be noted, does not always prevent either impregnation or delivery.

Gase—Hystera a cause of impotence in the female—"In this case, where the parties had colabilated for two years and ten months, and the man's capacity and desire to consummate were not questioned, the court being statisfied of the bona fides of the suit and of the practical impossibility of consummation in consequence of the hystera of the woman pronounced a decree of multity, although there was no structural defect in the woman —Tidy, Leg Med., II p 102, G v G, L R 2 P & D p 287

Gase — A smalar case — 'In a suit for nullity of marriage, it appeared from the husbands evidence that whenever he attempted to have intercourse with his wife the act had produced hysteria on her part, and that, although he had colabited with her for more than three years, the marriage had never been consummated The wife refused to submit to inspection Decreensis granted '— Flay, Leg Med', If p fifty Case of H v P, L R 3 P & D p 126

<sup>&</sup>lt;sup>1</sup> Taylor, Med Jur, I p 302 Lect Med Jur, p 85 Woodman and Tidy For, Med, p 684

#### CHAPTER AT

# VIRGINITY AND DEFLORATION.

ONE of the questions which may arise in nullity of marringe suits is as to whether a certain funale is error intacta or not. The same question may also arise in other cases eg-(1) in divorce cases and defamation cases, (2) in cases where an unmarried female is alle ed to be a prostitute, and as such liable to be dealt with under the Contagnous Diseases Act, or other similar law (see Case below) (3) In rape cases. In these latter however it is not an essential question secure that valual penetration is all that is necessary to constitute the offence of rape (see 'Ripe ) and this may be effected without destruction of the signs of virginity (See Figs. 22 to 20 pp. 272-3)

Case -Two women afterwards found to be prostitutes result of examination as to virginity doubtful in the case of one -Two young women of genteel appearance were attacked in the public streets by some young men who called them opprobnous name, and told the passers by that they were no better than common prostitutes Some good natured persons resented this conduct and took the girls part and a complaint was lodged on their behalf against their defamers who were summoned before a magistrate. The def ndants plead d a justification while the females on the contrary stoutly insisted on their purity and even offered to submit to inspect on by a medical examiner which the opposite party I sworn inspector clever and conscientious was dared them to do appointed by the mag strate and reported that it was totally out of his power to say anything certain as to one of the females she might or might not be a virgin but that the other had probably had some inter course with men though he could not assert the fact postively. Let it subsequently came out that these young women had actually been for some time on the registers of the police and had both had repeated attacks of the veneral disease.—Guy For Med p 56 quoted from Parent Duchatelet

1 The Hymen —The most reliable sign of virginity is an intact hymen

(1) Is the hymen alway present s—At one time it was alleged by many authorities that the hymen was frequently abent. This view has however been proved by later observations to be erroneous. It was found for example to be present in each one of the 650 cases examined by Devilliers, Orfile.

and Tardieu <sup>1</sup> Capuron however, records a case of congenital malformation of the genitals with absence of the hymen.<sup>2</sup>

(2) What is the natural condition of the hymen in the virgin? -Practitioners often have the most vague conception of the hymen and mistake for it the thin margin of the fourchette Powell's practical directions for its examination are given in Appendix VIII A very common form of the membrane, after the age of infancy especially, is that of an irregularly circular diaphragm, broken at its upper third by an opening more or less large and placed more or less distant from the lower border of the vaginal orifice In a third set of cases the hymen has been described in late observations as a sort of diaphragm, exactly and regularly circular, pierced by a central opening. A fourth form assumed by it, and that its most common appearance, is that of a semicircular fold of integument stretched across the lower border of the vaginal orifice its free border concave and notched (échancre), and its extremities losing themselves in the labra minora Lastly, the hymen has been occasionally encountered in the shape of a mere narrow fringe around the entrance to the canal of the vagina, in one case as a sort of bridle across the vigina, with a passage on each side, in another as a complete septum pierced by numerous minute openings, and in a third instance as a double septum, without any opening whatever into the vagina The entrance to the vagina is thus practically closed or narrowed by the hymen, which in early life is most usually vertical, but by the natural development of the parts gradually assumes a horizontal direction Towards puberty more firm and consistent than in early life, as menstruction becomes established it becomes more or less fluccid, presenting less resistance to their flow, and is more easily lacerated

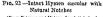
(3) What changes are produced in the hymen by sexual intercourse?—As a general rule, when sexual intercourse takes place, the hymen is lacerated or ruptured, in the latter case giving rise to 'those small pyramidal tubercles, from three to six in number, known as the carincular myriformers." If, however, the aperture in the hymen be larger than usual, or the membrane itself be lax, repeated intercourse may take place without rupture or even loceration. Many cases are recorded, in fact, where the hymen has existed all through pregnancy, and has only ruptured at the time of delivery. In very young children the hymen, owing to its deeply scated position, and to the narrowness of the parts, is not usually even lacerated by intercourse.

<sup>1</sup> Ogston Lect Med Jur p 102 2 Guy, For Med , p 55

Tidy, Leg Med , II p 97 Leg Med , II p 201

Case -- Hymen is present, and apparently sutact, in prostitutes, etc. -At Martineau's service in the Broca (then Loureme) Hospital in Paris, I saw a girl who had come to the out patient department for treatment of what was to all seeming an insignificant leucorrhea. There was no obvious urethritis, nor were 51 ene a tubules affected, a point to which Martineau used to pay particular attention, and there was present a hymen whose orifice was larely two millimetres in diameter. But this girl was suffering from gonorrhoes, and admitted that she had infected everal of her customers, she being a clandestine prostitute of the purheus of the Sorbonne She had been on the town for over a year, and had entertained as many as five men 10 a sangle afternoon on a fote day. Her ivmen was elastic, and admitted of the massage of a large rectal boncie.





(From Peterson and Haines Legal Hot cine.)



Fig. 23 -Intact Hymen, fimbriate (From Leterson and Halnes.)

returning to its obturator like condition when this was withdrawn -W D Sutherland Ind Med Gav, 1902, 245 See also Case below

The hymen may be ruptured, on the other hand, by the introduction of foreign bodies other than the penis, eg (1) accidentally,-this, however, is extremely rare, or (2) by the introduction of instruments during an examination or surgical operation, or (3) in practising masturbation, especially if the body introduced is of large diameter, or (4) in endeavours to dilate the parts of young females, so as to render them apla weres . Casper mentions a case where the mother of a girl aged ten employed first her fingers and then a long stone for the purpose,

thereby lacerating the hymen, <sup>1</sup> and Chevers mentions the use in India for this purpose of the fruit of the plantain, and also of pieces of sola pith, the girl being made to sit in water, so that the pith may swell and dilate the pirts <sup>2</sup>

It has also been asserted that the hymen may be ruptured by indirect violence in a fall, or during violent exertion; this

appears, however, to be very doubtful.

(4) Can virginity or non virginity be inferred from the condition of the hymen? If the hymen is intact (not even



Fig 24 —Ruptured Hymen crescentic, with two Lateral Lacerations (From Peterson and Haines Legal Medica to)



Fig 25—Ruptured Hymen, circular torn in Several Places (From Peterson and Halpes.)

lacerated), the probabilities, except in the case of females below the age of puberty, are very strongly in favour of virginity; and the inference of virginity becomes almost certain if the membrane is normal in position and structure, and its aperture is of small size and undilatable, and if accompanying this condition of the hymen the other signs of virginity (see below) are present

Case —Evidence of virginity in disproof of alleged adultery.—It was alleged by defendant that the plaintiff, a married man, had had

<sup>1</sup> Taylor, Med Jur , II p 430

adulterous intercourse with a young woman and that at an anteredent period she had left her home for the nurpose of girtug larth to a child privately. The late Dr. Asiwall was called upon to examine the soman that the deposal dark in his opinion she mas a virgin and had neces had and the late of the late

Case—A similar case—In this case which involved on action for defamation of character the plantiff a married man, et 64, had been chur, cd with committing solutiery with a certain woman. Several witnesses for the defendant positively swore that they had seen these persons in carnal intercourse. This was denied by the plantiff, and as an answer to the case model evidence was ten lered to the effect that the woman with whom the adulterous intercourse was alteged to have taken place had been extrained and the lymen was found intact. In cross examination however this was admitted not to be a conclusive Disk. Deligence I extracter, Living Living 1828.

On the other hand, the absence of an intact hymen, although strong evidence of non virginity cannot be taken as conclusive proof thereof, seeing that as already stated, the hymen may be ruptured or lacerited by the introduction of foreign bodies other than the penis

Other signs of Virginity—(1) The Bicatts—These in young adults are hemispherical, plump and elastic, but a single act of conties is unlikely to alter this (2) The Veguna has a narrow and rigose condition the clitoris uncularged, and the labia elastic and in close contact. (3) The Fourthette present (though it is not usually ruptured on first connection). (4) Absence of signs of previous delivery, of fourthette and perinaum entire. All such signs taken by themselves, are unreliable as evidence of virginity, but are useful as corroborating evidence of virginity derived from the condition of the hymer.

Signs of Loss of Virginity —These are the absence of the absence of virginity and are —(1) Torn hymen, (2) agar of myury, and (3) signs of implanted venercal disease—though all of these may be accounted for otherwise than by sexual intercourse.

#### CHAPTER XII.

# PREGNANCY IN RELATION TO CRIME AND LEGITIMACY.

## Age of Marriage for Hindus.

- "If a man marry, he must select a maiden who is of a third of his age "—
  Vishnie Pur ina, 3, 10, Wilson's ed, 3, 101
- "Leta man of thirty years wed a lovely mad of twelve, or a man of twenty-four a maid of eight. If his virtue is being impaired let him be expeditious.—Make, Iristitutes, 9, 91. The marriage for all castes of a girl after her seventh year is commended, O king. Her marriage otherwise is reprobated by the law!—Maka Bh iritata cited in Colebrooke's 'Digest of Hindu Law,'' 8, 28

THE law may request (it cannot order) a medical man to examine a woman to ascertain whether or not pregnancy exists, for the following reasons —

- When the second is a common condemned to be hanged or to hard labour—
  We pregnancy is pleaded in bor an execution in India, owning to the
  wording of \*820 of the Or \*De Code, the question to be decaded as simply.

  Is the woman pregnant or not's In England, however, owing to the
  terms of the charge to the jury of matrons, a medical man called in to
  their assistance may have to examine into the further question, Is the
  woman "with child (pregnant) of a quick child
- (2) The birth of a posthumous here by a undow—Where a widow is suspected of feigning pregnancy in order to ultimately produce a suppositions here to an estate of which her husband died possessed—In such a case, according to the law of England, the her presumptive to the estate, i et the person who would succeed thereto, supposing the woman not to be pregnant, may apply to the court to order an inquiry to be made into the alleged pregnancy. The court, if it grants the application, does so by issuing what is technically called a writ "de ventre inspiciendo."

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- (3) To encrease damages en a seduction case
- (4) To disprove litels in charges of adultery, etc. The woman alleged to be pregnant may be a married woman living anart from her bushand and the allegation may be put forward in support of a suit for divorce Or she may be an immarried female or a widow, who has been defamed and seeks to avoid disprace
- (5) In cases of alleged abortion -An attempt to cause miscarriage is an offence prespective of whether the woman be or be not pregnant Further according to the law of India (but not according to that of Fingland) to cause or attempt to cause, a woman "quick with child" to miscarry is a graver offence than if she be not quick with child! Hence in India, in these cases the question may arise, whether or no a certain female was "quick with child" at a particular time (See Causing Miscarriage 1

#### (6) As motive in suicide and minder

Cases - Pregnancy a motive for murder or suicide -(a) A widow seven months gone with child died rather suddenly, an inquest was held by the police, and a verdict returned of death from dysentery busineson, however being excited, a post morten examination was ordered the result of which was the discovery of the pregnant condition of the woman (which had been concealed in the inquest report furnished by the police), and of the fact that the cause of death was arsenical poisoning The district magistrate remarks, in reference to this case that there is every reason to believe that all engaged in the inquest tried to conceal the true cause of death -Bo Chem An Rep for 1884 reported by the District Magistrate of Bassim Hyderabad Assigned Distracts

- (b) In this case which occurred in the Surat district as in above case, the cause of death was argenical poisoning and the deceased was a willow far gone in pregnancy The brother and sister of the deceased confessed to having given her eight annas worth of opium in order to procure abortion or to cause death, so as to avoid the disgrace arising out of her condition No or mm, however, could be discovered in the viscers of the deceased.-Ibid
- (c) Alla Bux, of Purneal, was convicted of murdering his brother s widow. He confessed that having administered drugs to her in order to cause her to abort and having failed he and others took her to a river lank, put a cloth into her mouth held her down, and murdered her ly cutting her throat - Chevers, Med Jur , p 733
- (d) Case of poisoning by arseme reported by medical officer, Tatta, Sind.— Deceased was promised in marriage to a man of her caste (Mussulman), but before marriage she cohabited with him and became pregnant and was advanced to above the fourth or fifth month, when her perents to avoid disgrace, it is said, tried very much to procure abortion 1 ut failed (much against her intended husband s will), so having failed to procure abortion her parents, to save their reputation, it is suspected, gave her poison in her food -Bo Chem An Ren . 1876-77. p 18

Signs of Pregnancy. - These may be divided into -(1) Probable and (2) Certain signs

Probable Signs -(1) Quelening -This obviously cannot be relied on for forensic purposes Apart however from any wilful endeavour to deceive a woman may be mistaken as to her condition She may mistake for example symptoms of organic disease for symptoms of pregnancy Cases are also recorded where no organic disease being present symptoms closely simulating those of pregnancy ( spurious pregnancy') and in exceptional cases of labour also have appeared Again a pregnant woman attributing her symptoms to disease may be unaware of her condition and remain so even up to the time of her delivery Further as impregnation is independent of volition on the part of the female conception may occur as the result of intercourse effected with her while in an insensible condition and in such a case a woman may be unconscious of the fact that she is pregnant and it is possible remain so up to the time of her delivery

(2) Cessation of menstruition -This sign is open to several iallacies Menstruation may cease owing to causes other than pregnancy A discharge of blood simulating menstruation may occur durin, pregnancy Again a woman may feigh or deny

monstruction in order to conceal her condition

(3) Worning stell ness is a common symptom but it may however arise from causes other than pregnancy

(4) Changes in breasts -The breasts enlarge become firmer and secrete milk A dark circle (areola) varying in width from half an inch to three inches studded with glandular follicles develops around the nipple Thise appearances may however arise from causes other than pregnancy or may continue after delivery Hence they may be present in a non

pregnant female Again they may be absent in pregnancy (5) Enlargement of abdomen and changes in uterus -The

cervix becomes full round soft and elastic, and the os loses its transverse shape and becomes circular and its edges become soft and indistinct Up to the end of the third month the uterus not having risen out of the pelvis the cervix is low down in the vagina and easily reached and no enlargement of the abdomen is perceptible. After this the uterus be ins to rise and the cervix to shorten recede and become indistinct. About the end of the fourth month the enlarged uterus begins to be perceptible above the pubes and rises to-between the pubes and umbilious during the fifth month, the umbilious during the sixth month halfway between the umbilious and the lower end of the sternum during the seventh month and to the ensiform cartilage during the eighth month As similar changes may take place owing to enlargement of the uterus from causes other than pregnancy more reliance is to be placed

on their absence as a negative sign, than on their presence as a positive sign of pregnancy

Certain Signs,—(1) Passive movement of factus (Ballote ment)—This sign is not available until the end of the fourth menth. It consists in the detection of a solid body floating (in the liquor anima) in the uterus

To obtain it the woman—her hindler and richim having been previously mpt ed—should be I laced in the upright position or recum servint the shoulders of the servine of the servine to be involved on the servine to be involved on the servine to be involved on the servine to be involved on the servine to be involved on the servine to be involved on the servine the servine. The other hand is standily pressed on the abdoman over the uterus A per la wards is then given with the figure in the vagina when a hand body will be felt to recede from and in three or four seconds fall lad on the fingers. After the end of the sixth month this sign is rarely analable the festus from its bulk not floating freely enough in the luquer cannut. Care must be taken to keep the fingers in contact with the overx otherwise a movement of the otherwise sixelf may be mistaken for the movement of the other within it.

(2) Sounds of fatal heart—This the most certain of the signs of pregnancy is described as resembling the tricking of a watch heard through a pillow. The pulsations vary from one hundred and twenty to one hundred and sixty a minute and are not synchronous with the mother s pulse. A double sound is heard at each pulsation.

The sounds are generally, but not always in normal presentations beard about mulway between the umblueus and one or other of the anterior superior spines of the illium they seldom can be heard earlier than the end of the fifth month and in every case should be heard after the sweath month. If detected the existence of pregnancy is certain but pregnancy may cust and the sounds not be detected, of owing to the camunation bung made at too early a stage (b) owing to the death of the fortis or (c) owing to want of skill on the part of the auxellator Ogston records a case where oning to ascites the sounds could not be detected by a skilled auxellation.

When any doubt exists it is always better to give the individual the benefit of the doubt. After death the discovery of an ovum or fectus in the uterus is of course an unequivocal sign of the existence of pregnancy. For the characters of the ovum or fectus at various stages of gestation, see table p 2°4. The presence also of a corpus luteum in the overv may afford corroboxative avidence.

'Quickening'

The whole question of 'Quickening as regards Indian Law is in relation to Section 312 Indian Penal Code

1.

The term 'quickening' is applied to certain peculiar sensations experienced by the mother at a certain stage of pregnancy These sensations are often accompanied by constitutional disturbance, and are popularly ascribed to the first perception by the mother of the movements of the fœtus They are most probably due to this cause, perception of the movements probably first occurring when the uterus comes into contact with the abdominal wall These sensations may be felt as early as the twelfth week, are generally first felt between the fourteenth and twenty-fourth week but in some cases are not felt at all during pregnancy A woman who has felt these sensations is said to have quickened These two terms, 'quickening' and 'quickened,' are derived from the word quick, used in its old signification, namely, 'living' fheir use with reference to these sensations, arises from the old popular belief that their occurrence denoted the first accession of life to the fœtus As, however, a fœtus is actually alive from the moment of conception, two interpretations may be assigned to the word 'quick when applied to a feetus in utero (1) The more extended interpretation, namely, that the fectus is alive, or (2) The more restricted interpretation, namely that the mother has experienced the sensation known as quickening

As regards the first of the two phrases in question, viz "with child of a quick child there appears to be no doubt but that this has always been used in law as if the more restricted meaning attached to the word 'quick' Some doubt however, has been thrown on the interpretation accepted by English legal authorities of the second phrase viz "quick with child owing to the remarks made by Baron Gurney in the case of R v Wycherley (8 C & P 262) In this case pregnancy having been pleaded in bar of execution, the jury of matrons were directed to try whether the prisoner was 'quick with child or not' Subsequently Baron Gurney addressed a medical witness called to the assistance of tho jury of matrons as follows 'Quick with child is having conceived, with quick child is when the child has quickened. Do you understand the distinction? Baron Gurney, therefore, in the case directed the medical witness to take the expression "quick with child as if the more extended meaning attached to the word 'quick This, however, is contrary to the law as stated by Blackstone, who says "If they (the jury of matrons) bring in their verdict quick with child-for barely with child, unless it be alive in the womb, is not sufficient—execution shall be "But if she (the prisoner) once hath had the benefit of this reprieve, and been delivered, and afterwards become pregnant again, she shall not be entitled to the benefit of a further respite for that cause For she may now be executed before the child is quick in the womb" In the I. P Code also, the expression "quick with child" is clearly used as if the more restricted meaning attached to the word 'quick.' Section 312 for example, makes causing miscarriage, if the woman be "quick with child," a graver offence than simply causing miscarriage, thus implying that the condition "quick with child is one which arises at a period subsequent to conception

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When, therefore the question arises, is a certain woman ' with child of a quick child" (or "quick with child'), what has to be determined is whether or not the woman has quickened. Quickening however is a sensation only felt by the mother Still, if a medical man has on examination, felt the actual movements of the foctus, he is justified in assuming that the mother has also felt them, and that therefore, she has quickened Should be be unable to detect the active movements of the feetus, he can only, in answer to the question, Has this woman quickened? state his opinion as to whether or no (1) The woman is pregnant, (2) The child is alive, and (3) The preg nancy has advanced to, or beyond the stage at which the sensa tion of quickening is usually experienced, leaving it for the court to decide whether his answers do or do not amount to an affirmative answer to the question. Has this woman quickened? In giving an opinion on the last of the three above mentioned points a medical witness should bear in mind that quickening \ does not occur at any fixed period, it may occur at any time between the twelfth and twenty fourth week | Further, it may be noted, that of the two cases in which the question of quickening arises namely, the English case of pregnancy pleaded in bar of execution and the Indian case of causing ! miscarriage, in the first the prisoner is benefited by being

miscarrings, in the first the prisoner is benefited by being found "quick with child" while in the second a similar answer has the reverse effect. The medical witness cannot say if the woman has felt quickening. She is the only competent witness to her own feelings. If however he (1) undoubtedly fiels the move ments of the child (2) liears the feetal heart sounds, he is justified in saying she is pregrant of a quick, i.e. a living, child! Otherwise he can only say (1) she is pregnant, (2) the pregnancy has revoked the stage at or before which quickening usually takes place.

. Many women have nover felt quickening in their prognancies.

#### CHAPTER AIII

#### BIRTH AND DELIVERY re INHERITANCE.

Birti or delivery is a more frequent medico-legal question than pregnancy. It arises when the right to inherit property or a title is in dispute. Thus when the succession is fixed in the male line to the exclusion of the female line the question may arise of what sex is a certain individual? (See Sex p. 35). Again as by law children born without the shape of mankind cannot inherit the question may arise. Has this child the shape of mankind? More commonly are the cases where the right to inherit is disputed on one or other of the following grounds—(1) That the claimant is not a legitimate child and with the medico legal questions which arise in such a case we may consider those which arise in affiliation cases (2) that as in tenancy by courtesy cases a certuin child was not born alive (3) that the claimant is a suppositious child

## Legitimacy.

....) \*

Children are either 'legitimate' or 'illegitimate,' which is also called 'bastard' Only legitimate children are regarded by law as the children of their father These therefore possess certain rights which illeg timate children do not possess According to the law of most countries only such children are held to be legitimate as are either born or begotten during the existence of a valid marriage (lawful wedlock) between their parents By the law of Scotland however children born before marriage become legitimate on the subsequent marriage of their parents Further according to the law of England any child born or begotten during lawful wedlock is presumed to be legitimate until the contrary is shown, (a) by proof of the impotence of the alleged father of the child or (b) by proof that the parties to the marriage had no access to each other at any time when the child could have been begotten sumption as to legitimacy of the law of India is embodied in s 112 of the Indian Evidence Act and is as follows that any person was born during the continuance of a valid

marriage between his mother and any man, or within two hundred and eighty days after its dissolution, the mother remaining unmarried, shall be conclusive proof that he is the legitimate son of that man, unless it can be shown that the parties to the marriage had no access to each other at any time when he could have been hecotten. "A. of "

Access in Legitimacy Cases —The courts in India would no doubt construct the 112th section of the Evidence Act in accordance with the English decisions. It will be noticed that the 112th section does not in terms refer to the presumption being rebutted if the husband be impotent, but proof of such impotency would negative the fact of 'access' in the sense in which it is submitted the word is used in the above section.

The English law on this subject is to be found in the answers given by the judges to questions put to them by the House of Lords in the Handway Ferrage Case (1 & & 5, 155, a 1 1911). The law, as then stated, was recognized in a subsequent case, in the House of Lords in 1857 (Albrita's Daries & C. & T.) p 103) and is a follows—1439 That when the husband and wife have opportunities of access, the prenumption of legitimacy may be reducted by circumstances inducing a contrary per samplion. Cash, That non access or non generating access may be case in which it is measured provide a physical fact: (3rd) That after proof of saxual intercourse evidence will not be admitted, except to diagrove the fact (4th) That sexual undercourse is greamed, unless net by such evidence as satisfies those who are to decide that it did not take place.

By 'access 1s meant saxual intercourse, and not such intercourse as is understood by being in the same place or in the same place or in the same place or in the same place or in the same place or in the same place or in the same place or in the same place or in the same place or in the same of place, the presumption of legitimacy is rebuited. In the case of Aplesford Aplesford, reported in the Time of July 3, 1853, the husband and wife were both living in London during the period, or same portions of the priod, when the child whose legitimacy was in question could have been begotten. The encumisances of the case regatived the probability of intercourse between the hubband and wife, although it was possible. The child was found, by the House of Lords, to be illegitimate. In the case of In re Wethlands Truttle (Innex, July 29, 1885), there was no evidence where the hubband (Innex, July 29, 1885), there was no evidence where the hubband suggestion. In the case of the case negatived and the hatter of the case negatived any probability of intercourse between the hubband and wide, and being satisfied it had not taken drawe from the case negatived any probability of intercourse between the hubband and wide, and being satisfied it had not taken drawe from the case negatived any probability of intercourse between the hubband and wide, and being satisfied it had not taken place, held the child to be illegitimate.

In the case of Bern Ishabitants of Manyfeld (I.Q. B. 418), the Court of the Court o

were in a low class of life, the wife being a pauper, circumstances which kay, J, in Hawes v. Draegen (23 Ch. Div p 178), said must be taken into consideration in determining whether the presumption is rebutted

Hence, the legitimacy of a child may be disputed on either of two grounds, namely, (1) that the alleged father of the child is impotent, or (2) that the parties to the marriage had no access to each other at any time when the child could have been begotten. The following examples show the medico-legal questions which may arise when legitimacy is disputed on the second of these two grounds

1 A husband on a certain date ceases to have access to his wife, after a certain interval the wife is delivered of a child. In such a case the legitimacy of the child may be disputed, on the ground that the interval between the last access of the husband and the birth of the child was greater than the utmost period to which gestation can be prolonged.

2. The parties to a marriage are proved, after a long period of separation, to have resumed access to each other on a certain date. After the lapse of a certain interval the wife is delivered of a child In such a case the legitimacy of the child may be disputed, on the ground that the period intervening between the date of resumption of access and the date of the child's birth was so short, that the child must have been begotten before access was resumed If in such a case the appearance of the child at birth indicates it to be a mature child, the question arises. What is the shortest natural period of gestation? or if the child is an immature child, what, judging from its appearance, was its uterine age at the time of its birth (see pp 291 f)? Again in such a case it may be alleged that the mere fact that the child was born alive and capable of being reared, proves that its uterine age at birth was greater than the interval which elapsed between resumption of access and birth, thus raising the question, What is the earliest period of gestation at which a 'viable' child can be born, ie one capable of living and being reared? Moreover, as a portion of the evidence bearing on the question of early viability is derived from cases where a viable child has been born a short time after a previous delivery, and as such cases may be accounted for by 'superfectation' (se conception of a second ovum during gestation of a first), the further question arises, Is superfectation possible?

It may be here remarked that, as his wife's adultery is a ground on which a husband may claim a divorce, questions similar to those arising in cases of contested legitimacy may arise in suits for divorce. The question as to the degree of naturity of a child may also arise in cases where a child is born soon after marriage, and where it is alleged that the pyrents must in consequence have had sevual intercourse before marriage and are therefore of immoral chiracter (see following case)

Gas:—A wable child born one hundred and seventy four days after marrage. The Rev. Mr Janhen was married on the Srd of March 1873, and on the 24th of lugast following his wife was delivere I of a get who, supposing his to have it can the fruit of sexual intercourse on the day of the marriage was only one hundred and seventy four days or fire calendar months and twenty one days old. The infant, which was undoubtedly ministure though to what degree could not be determined, died on the 26th of Varch 1850 having survived about seven months On this Mr. Jardine as parakinoners brought a charge of incontinency squared from Love the Greened Assembly of the Church of Scotlane. The main question in the case was "-Was it possible that a child not more than one hundred and seventy four days old at burth, could be maintained alive for seven months? The court found the charge 'not proven.—This Jardine Case Guy For Mr. [ p. 127

Affiliation cases—Although illegitimate children are regarded by law as the sons of nebody their father is bound to contribute towards their support until they lave attained a certain age. Hence a woman hiving been delivered of an illegitimate child may appear before a court and claim that a certain individual who she alleges is the father of her child, may be compelled to so contribute Such cases are called 'affiliation cases, and in them questions may arise similar to those arising in cases of contested legitimacy. In affiliation cases also the further question may arise. Can any opinion as to the paternity of the child be formed from its resemblance or non resemblance to its allegid father?

Tenancy by courtesy—By the common law of England, if a man survived his wife, and he had assue by her born alive, that might by possibility inherit the estate as her hear, the lunshind so surviving became entitled to an estate for the residue of his life in such lands and tenements of his wife as shown as solely exceed of in fee simple or fee tail in possession. The husband, while in enjoyment of this estate is called a tenant by the courtesy of England, or, more shortly, tenant by courtesy.

To establish this tenancy by courtesy the child must be born during the exustence of this marriage and hence although the right scernes to the husband if the child is extracted by Cesarcan section during the mother a life it does not accrue if the child is so extracted after her death, for in that case the marriage has ceased to exist before the burth of the child. Jurther the child must have been complicity form and must, after complicit burth, have manifected some signof life, the slightest sign

Williams on Real Property, p 274

of life, however, a mere tremulous motion of the lips, for example (see following Gaze), has been held by the English courts sufficient to establish the fact of live birth in these cases? Much stronger evidence of live birth is, however, required in cases of infanticide (see 'Infanticide'). As in a case of disputed right to tenancy by courtesy, it may be alleged in opposition to the claim, that the child, when born, was so immatine that it could not possibly have manifisted any sign of life after birth, the question may arise on these cases, What is the earliest period of gestation at which a child can be born capable after birth of manifesting signs of life?

Case — Proof of live birth in a tenancy by courtesy case — The wife of the plantiff, who was possessed of an estate in her own right, did after having given birth to a child. The child was supposed to have been born dead, and the estate was surrendered to the defendant, her her Ten years afterwards facts came to the knowledge of the plantiff which led him to believe that the child was born alive, and that he had there fore wrongfully surrendered the estate. The evidence of live birth was a follows it was proved that the according in a stellar of the child was born, ledered it, wo to be the child was born beed it and the stellar of the child was born to the child was born to the child was born to the child was born to the child was born to the child was born to the child was born to the child was born to the child was born to the lips of the child sufficient to establish the fact of live birth—Fish v Palmer, Taylor, Med Jur, 11 p. 207

It is possible that a claim to be tenant by the courtesy might arise in India as there are estates held in India subject to the English Law of Inheritance (see remarks of Mr Justice Pontifex in case below). No such claim, however, could be made by any one whose marriage had taken place since the 31st of December, 1865, as s 4 of the Indian Succession Act, 1865, enacts that no person shall by marriage acquire any interest in the property of the person whom he or she marries That section, by s 331, is not applicable to marriages contracted before the 1st January 1866

Care.—Tenancy by courtery m India.—In this case the widow of an Armenian, married before the Dower Act 29 of 1839, was held to be entitled to dower out of her husband a lands. In the course of the argument, Fontier J, remarked "I twould take away from the mutuality of contract between husband and wife to hold that the widow is not entitled to dower as against a purchaser from her husband. The husband is entitled to an estate by the courtesy of his wife's lands."—Sarkies v Proconomogen Dosset, I L. R. 6 Cale, p. 794

Supposititious children.—By a supposititious child is meant a child produced by a woman who avers it to be hers when it is not. In these cases the motive is generally to further an attempt either to extort money or to divert'

<sup>&</sup>lt;sup>1</sup> The Scotch courts require, in order to establish the fact of live birth in civil cases, proof of commencement of respiration (Ogston Lect on Med Jur, p 182) For crying as a proof of birth, see 'Infanticide' Chan XVI

succession to property. A suppositions child may be one (1) produced by a woman who has never been delivered of a viable child or (2) produced by a woman in substitution for a child of her own. In case, (1) besides questions similar to those occurring in legitimacy cases the following additional questions may area. (a) Is this woman sterile? and (b) does this woman show signs of having been recently or previously delivered of a viable child? In case (2) it is very seldom that melical evidence can afford any assistance. In both cases as in affiliation cases the question of how far the paternity of a child can be inferred from its resemblance or non resumblance to its alleged parents may also arise.

Case -Slingsly baby 1916

#### Inheritance

The chief medico legal questions which may arise in cases of dispitted right to inherit are (1) Is a certain individual impotent or sterile? This question has already been considered (see Impotence and Sterility) (2) What is the statural period of human gestation? (3) How fir may this period be prolonged? (4) Is superfectation possible! (5) What is the enhancers of cluldren born at various periods of gestation? (7) How far may the paternity of a cluld be inferred from its resemblance or non resemblance to its alleged parents? (8) Has this woman our been delivered of a viable child!

The Average Period of Human Gestation?-The dura tion of gestation may be estimated by (1) Observation of the period intervening between cessation of menstruction and delivery and (a) observation of the period intervening between a single cortus and delivery Of these two methods the first cannot be relied upon to give precise results because (a) menstruction may cease from causes other than pregnancy, or may continue after pregnancy has commenced and (b) impregnation may occur at any period during the menstrual interval. The second method although more precise than the first also cannot be relied on to give accurate results because impregnation is not necessarily coincident with cortus but may occur as long thereafter as the spermatozoa retain their vitality which they may do for several days after emission. The duration of natural gestation appears to be not a fixed period but one subject to variation within certain limits Guy for example states that of fourteen authentic cases in the human sulject in which the duration was ascertained by reckoning from a single costus the minimum duration was

270 the maximum 293, and the average 284 days. Again Wharton and Stillé give a table of all the authentic crass of this kind in the human subject they have been able to collect. Their table includes fifty six cases and shows a range of Total author of from 260 to 296 days with an average of 276 days.

The view that the duration of pregnancy is not a fixed period is supported by the results of observations on the lower inimals. Thus from three series of observations on cows the minimum period in these appears to be 241 days, and the vertage period 280 to 285 days but in one series '(160 inimals) a period of 308 days was observed, in the second series '(764 animals) a period of 313 days was noted, and in he third's (1105 animals) in four delivery took place in the orty eighth week equal to a duration of over 329 days, and no one in the fifty first week equal to a duration of over 350 lays. Again a series of 102 observations on marce' gave a range of 311 to 394 days, with an average of about 340 days, and another on 177 sheep 'duration of 145 to 171 days with in average of 150 days.

How long may Human Gestation be prolonged !—The chief onsiderations bearing on this question are as follows —

1 Of the fifty six authentic cases collected by Wharton and Stillé in which the duration of gestat on was fixe I from a single costs in nine cen the duration was over 280 dars and in two of these it was 291 and

n three others 296 days.

2 In except onal cases where the commencement of pregnancy has seen fixed by the death or absence of the husband or male a longer period libna 296 days has been recorded. Thus Guy on the authorty of Henrit puotes a case in which the duration of pregnancy as fixed by the sudden leath of the husband was 506 days, and in two less satisfactory American illilation cases in which the commencement of pregnancy was fixed by late of last intercourse the alleged duration was respectively 318 and 317 lays. In both these cases the court deceded in favour of the planniff thus

admitting the possibility of prolongation of pregnancy to the periods stated 3 In a very large number of cases recorded by various authorities n which the duration of pregnancy was estimated from the last day of menstruation the longest period recorded was \$25 or 293 days. As how ever, conception may occur at almost any period during a menstrual interval these cases cannot be relied on as showing anything more than that pregnancy may be prolonged for \$20 or 393 less (say) 23 days. This would give 303 days or a shorter period than in Hewitt case. In four less certain cases of the same kind the estimated period of gestation was 300 to 318 days (Surphon) and 814 and 824 days (Vurphy).

4 In the lower animals it has been observed that the duration of pregnancy, as estimated from a single contus may be greatly protracted beyond the usual period

For Med p 123
Tessier's Guy For Med p 124
Krahmer's Wharton and Sullé III p 44

Tessier's Guy For Med p 124
 Krahmer's Wharton and Stillé III p 43

On the whole therefore as regards the question, Whit is the longest period which in natural human gestation may intervene between cottus and delivery!—the form which the question under consideration assumes for forensic purposes—it may be stated that (1) It may be regarded as proved that this may be 296 days (2) Most authorities agree in considering that the interval may be as long as 44 weeks or 308 days indeed in the Gardner Peerage case several eminent obstetic cans give it as their opinion that the interval might extend to, at any rate 311 days <sup>1</sup> (3) Some authorities consider that the interval may extend to the forty sixth week, 315 to 322 days <sup>2</sup>

Superfedation—It may be stated (1) that two closely following acts of intercourse in the same female may each prove fruitful (see sace below), and (2) that it cannot be doubted but that conception may occur during pregnancy in cases where the uterus is double or bipartite a rare condition in the human female but "till one of which several instances are recorded

Case —Two closely following acts of intercourse in the same female, both prove fruitful. A female as Charleston in South Carolina was delivered in 174 of tums within a very short time of each other. One was black and the other white the confessed that on a particular day, jumediately slote her husband had left his bed a negro entered her room and by threatening to murder her had connection with her —Gurs I or Med vs 132 one of several cases muded by Beck.

Lxcluding these two classes of cases and limiting the question to whether the organs of the female being of normal formation it is possible for a conception of a second embryo to occur during gestation we find that authorities are divided in opinion on the subject. The arguments for and against the possibility of conception occurring under the conditions stated are founded on (1) physiological considerations and (2) recorded cases

1 Physiological considerations—Ti ose who deny the possibility of the occurrence allege that the plugging of the os uteri and Fallopian tubes and the formation of the deciline events which occur at a very early stage of pregnancy offer an impa-sable barrier to the passage of the seminal fluid. On the other hand those who affirm the possibility of superfactation deny that these conditions invaniably offer an impassable barrier to the seminal fluid (especially previous to the end of the third month) and point out that as in exceptional cases menertual blood final ris way out of the uterus during pregnancy it is typinference also possible that seminal fluid may find its way in

See Ogston's Lect For Med p 189
It is not until the end of the third month that the decidua reflexa or portion of the decidua surrounding the ovum comes into contact with the decidua vers or portion of the decidua ining the uterus

<sup>&#</sup>x27; In this case the question at issue was as to the legitimacy of an individual born 311 days after the last access of the husband (see Guy F r Mel, p 125)

2 Recorded cases -The cases brought forward in support of the view that superfectation is possible, may be divided into two classes, viz -(a) Cases in which a woman is delivered at or about the same time of a more or less mature child and a less developed dead feetus, e.g. as in a reported case of a mature child and a dead fortus of apparently five months Many cases are, however, reported showing that a dead fectus may be retained in the uterus until the full term of pregnancy has expired, or even for a considerable period beyond. Hence cases of this class can be explained on the supposition that conception of the two children occurred at the same time, but that one died and was retained in utero until the delivery of the other Obviously, therefore, such cases do not support the view that superfortation is possible

(b) Cases in which a woman is delivered of two more or less mature children, a considerable interval but still an interval shorter than the usual period of gestation separating the two births Cases of this kind. where the interval between the births is comparatively short-e q in one reported case a month-are easily explained on the supposition that con ception of the two children occurred at the same time, but that the delivery of one was delayed Other cases of this description again, in which the interval between the two births is comparatively long, can be explained by supposing that conception of the second child occurred after delivery of that first born It should, however, be noted, as bearing on this possibility, that it is highly improbable that conception can occur until a week after delivery, probably a fortnight must intervene 1 A few cases, however are on record in which the interval separating the births of two viable children has been four to five months, e.g. Case below, and a case referred to by Taylor, in which the interval was 127 days (see also Case below, in which the interval was 167 days, but in which no sexual intercourse took place until twenty days after the first delivery)

Supposed superfoctation,-The wife of Raymond Villard, of Lyons, eight months after a previous abortion at the seventh month, was delivered of a living female child. "This delivery was not followed by the usual symptoms no milk appeared, the lochia were wanting, and the abdomen did not diminish in size Three weeks after her delivery she again felt the motions of a feetus, the abdomen increased in size, and five months and sixteen days after delivery she was again delivered of a living daughter' Both children were alive two years after the birth of the first child "Dr Desgranges, who attended the case, adds to his report that the second child could not have been concerned after delivery of the first, masmuch as no sexual intercourse took place between the husband and wife until twenty days after the first delivery," or four months and twenty-seven days before the birth of the second child (Guy, p 133)

"Marie Anne Biguad, of thirty seven, gave birth on April 80, 1748, to a full term mature boy, which survived its birth two and a half months, and to a second mature child (girl) on September 16, 1748, which lived one year. The interval between the two births was thus four and a half months (= one hundred and thirty nine days). The mother, after her death was proved not to have had a double uterus" (Tidy, Leg. Med , II p 149, quoted from Naphey, 'Physical Lafe of

Women, p 156)

Cases such as these involve the acceptance of one of three propositions, viz either (1) That superfectation is possible, even, as in the former case, when the uterus is not double, or (2) Supposing conception of the second child to have taken place after the birth of the first, that a viable child may be born at a very early ub rune age, e.g in Taylors case at 127, or more probably 120 dys or (3) As suggested by Wi arton and Stillé, that no case so it wan pregnancy the pressure of one chalf on the other, unstead of, as as sometimens the case, causing the death of one of the kno may no exc. pitonal cases simply retaind its development, the result being that one child is born nature at the full period, and after its hirth, development of the second child continues, until it also reaches maturity, when its butth takes they have the continues, until it also reaches maturity, when its butth takes they are the continues, until it also reaches maturity, when its butth takes they are the continues, until it also reaches maturity.

What is the earliest Viable Age?-What is the earliest period of restation at which a child may be born alive, capable of living and being reared?-Here it may first be remarked (1) that there is no doubt but that a child born at or after the 210th day of uterine life may be reared, and (2) that the evidence afforded by recorded cases so strongly supports the [ view that children born as early as the 180th day may be reared, that the possibility of this cannot be denied regards the question of viability before the 180th day, it should be noted that the validity of the evidence afforded by cases cited to prove early viability mainly depends on the accuracy with which the date of conception is determined, for although the characters of a child at birth afford indications of its age, they cannot be relied on, except as corroborative evidence. In some of the cases cited as evidence of early 3 virbility, the date of conception is fixed from a previous delivery, eg the case mentioned by Taylor (see 'Superfectation') in which a viable child was born 127 days after a previous deliver). and another similar case referred to by the same author, in which the interval between the births was 174 days 1 If we assume that in these cases concention of the second child did not take place until after the birth of the first, we must admit! viability to be possible at respectively the 120th and 167th day of intra uterine age Obviously, however the acceptance of cases such as these as valid evidence of early viability, rests on the assumption that it is impossible for either superfectation or retardation of development, as suggested by Wharton and Stillé, to occur

Of the cases in which the date of conception is fixed independently of a previous delivery, there is one—Dr. Outrepon's case (see p. 200)—in which a viable child was born twentyfive weeks (175 days) after the last menstruation of the mother 'Cuy, in reference to this case, says—'fit is very valuable, for all is the only quite unequivocal instance on record of the rearing of a six-months child.' The Jardine case (Case p. 234) is a very doubtfully authentic case of the rearing of a 174 day child

Taylor, Med Jur , H. 229 Guys For Med (4th ed), p 136

There are also a few less reliable cases of the rearing of children born at a period earlier than the 174th day 1 Among these the earliest visible age recorded in 133 days (Dr Rodman's case) 2 The evidence afforded by these cases in favour of viability at a period earlier than the 174th day is further supported by certain recorded cases in which children born at an earlier ale than this lived for some days after birth 3

As regards the further question What is the carliest age at which a child may be born capable after its birth of showing signs of life? it may be stated that there is more than one reliable case on record showing that a child born between the fourth and fifth month of uterine life may after birth manifest signs of life. Among these may be mentioned Dr. Barrow's case of a child born at 144 days which after birth breathed convulsively at intervals for forty minutes 4

After the fourth month the uterine age of the feetus is in dicated by the following characters (A) During life -(1) Its length and weight (2) changes about the eyes (3) the appear ance of the skin nails and scalp hair and (4) the position of the middle point of the body (B) After death the tollowing additional characters become available -(1) The progress of ossification (2) the condition of the intestines, (3) the condition of the gall bladder (4) the position of the testicles and (5) miscellaneous characters. According to Guy, Tidy and others these characters are as follows -

1 The length and weight -The table below gives the average length in inches and average weight in pounds and ounces at the end of each month

Mon h	Lengt	We gbt.
4 5 6 7	1n 1 41-81 61-101 8-131 11-16 14-18	1b oz 1b oz 0 d -0 7 0 5 1 1 1 0 0 2 0 0 -4 5 3 4 5 5 4 5 -7 0

<sup>\*</sup> Eg Dr Barkers case 158 days (Med Times 1850 Vol II pp 219 39°) and Capuron's doubtful case of Fortunio Luccti 135 days (Guys I or Med p 129)

Guys For Med p 129
 Egy Eleschmann's case of a child of 168 days liv ug for e ght days (Guy For Med p 134) and Dr Routh s case of a child born between the fifth and sixth month living for e ghteen days after is bith (Obstet Trans 1871)

Wharton and Stille Vol III p 51

- 292
- Luceptional cases are recorded of children at birth being unusually large and heavy The greatest length and weight recorded appears to be 32 inches, and 18 lbs 1 oz , next to this comes a case where the length was 21 inches, and the weight 17 lbs 12 oz 1
- 2 Changes about the eyes -The evelids are adherent, and the membrana pupillaris vascular and distinctly visible up to the end of the sixth month. At the end of the sixth month, the eyebrows and eyelashes are beginning to form At the end of the seventh month, the evelids are non adherent, and the membrana pupillaria is beginning to lose its vascularity, and by the end of the eighth month, it is so thin and transparent as to be only with difficulty discernible
- S Appearance of the skin, nails, and scalp hair -- Up to the end of the fifth month the skin is destitute of fibrous structure and sebaceous covering. At the end of the sixth month, it begins to show a fibrous structure, and papilles begin to appear; at this period it is covered with down and sebaceous matter begins to be visible on its surface the end of the seventh month, it is dusky red, thick, and fibrous, and covered with sebaceous matter By the end of the eighth month, it is covered with fine short hairs and the schaceous envelope is well marked At the end of the minth month, the down has disappeared from the surface of the boly except the shoulders The pails begin to appear at the end of the fourth month, are very distinct at the end of the fifth month, and gradually increase in length, reaching the ends of the fingers at the end of the eighth month Hair on the si alp begins to appear at the end of the fifth month, is about quarter of an inch long at the end of the seventh month and at the end of the month month has attained a length of shout an mch
- 4 The position of the middle part of the body -This up to the end of the fifth month hes on the body of the sternum, gradually descending, it reaches the lower and of the sternum at the end of the sixth month, is pearer the umbilious than the sternum at the end of the eighth month, and at the end of the minth month is generally about three-quarters of an nch above the umbilious

#### FURTHER SIGNS AVAILABLE AFTER I SATH

1 Ossification.-At the end of the fourth month the ossicles of the ar are found ossified, and points of ossification have just appeared in the apper part of the sucrum (for points of ossification appearing before he end of the third month, see table on page 294) By the end of the ifth month points of ossification have appeared, in the pubis, os calsis, XIS, and odontoid process, at the end of the sixth month, in the our divisions of the sternum, at the end of the seventh month, in the strugalus, at the end of the eighth month, in the last sacral vertebra; and at the end of the minth month, in the lower epiphysis of the femur This last point of ossification is not present at the end of the eighth nonth, and great weight is attached to it by Casper and others, as a sign f maturity According to Casper, its diameter in miture children is hree quarters of a line to four lines, and Tidy adds that if it is more than hree lines in width, the child has probably survived its birth "This

nucleus appears to the naked eye as a more or less circular blood spot in the midst of milk white cartilage '1

- 2 Intestunes—At the end of the fourth month, the duodenum contains meconium, the creem is placed near the right badaey, and the excal valve is viable. At the end of the fifth month meconium of a yellowish green tuit is present at the commencement of the large intestines. At the end of the sixth month in the large intestine saccul begin to appear, and meconium is present in the upper part. At the end of the seventh month the creem lies in the right line fossa, the valvulin conniventes begin to appear, and meconium is present nearly throughout the whole length of the large intestine. At the end of the ninth month the meconium has reached the rectum.
- 3 Gall bladder—The gall bladder begins to appear at the end of the fourth month, is distinct at the end of the fifth, contains insight serous fluid at the end of the sixth, and bile at the end of the seventh month
- 4 Position of testicles—At the end of the sixth month these he close to the kilneys and at the end of the seventh have begun to descend towards the internal ring, which they reach at the end of the eighth month. At the end of the ninth month they have, as a rule, passed through the canal and are often found in the scrotum.
- 5 Other characters —At the end of the fifth month the germs of the permanent teeth are visible at the end of the sixth month the cerebral hemispheres cover the cerebellum. At the end of the seventh or eighth month the cerebral convolutions are apparent.
- (?) Paternal Likeness and Disputed Paternity—May paternity of a child be inferred from its resemblance or non-resemblance to its alleged parents?—Undoubtedly peculiarities of the parents are frequently transmitted to their offspring, by the general characters of the features, the colour of the skin, certain deformities, tendency to discose, tricks of manner, character of the voice, colour of the hair, etc., etc. Peculiarities in the parents are, however, not necessarily transmitted to their children, and, as before pointed out, a peculiarity may be subject to atavism, and miss one generation, appearing in the next. More weight, therefore, is to be attached to the presence of hereditry peculiarities as affirmative evidence than to their absence as negative evidence, of paternity. Other things being equal, the more close the resemblance, the stronger the presumption of paternity.

Recent Delivery.—Has this uoman ever been delivered of a valle child?—The signs of recent delivery may be present and supply an affirmative answer—these signs will be discussed under 'Infanticude' (see p. 328) On the other hand, the signs of virginity may be present—the presence of these, especially of an intact hymen, is a strongly negative indication. An intact

I Tidy, Leg Med , II p 59 (1 line = 1th of an inch)

I	CYPERSAL CHARAC	геня од тит Горт	38 AT THE END OF	Evernal Characters of the Potos at the Ead of Cach Mown of Upping Lips	errys Live	
Month	7		9	L	oc	6
Average length in mebes Mean weight (Guy)	S of H	84 11 ozs	14 2 lbs 2 czs	3 lbs 8 ozs	17 4 lbs 5 ore	101 6 lbs 8 ozs
Skin	No schaceous cotori structure apparent	No seluctous covering or fibrous structure apparent	Fibrous structure papillo and so- theocors mutter beginning to appear covered with down	Dusky red th ck and firous and covered with se I accous matter	Covered with fine short hairs and sobaceous matter	Down almost all disappeared covered with so baccous matter
Nalla	Appearing	Very distinct	Growing	Do not quite reach to end of fingers	Reach to end of	
Mar on scalp	None	Арровения	Distinct	About a quarter of Over a quarter of About one inch an inch long long	Over a quarter of an inch long	About one inch long
Fyes, etc.	Lida adlicemt Jaris distinct	mombrana popul	Lids adherent membrane pu pilaris distinct eyebrows and eyelashes begin ping	Lids non edher- ent, mombrana pupillaris get- ting indistant	Membrana pu pilaria hardiy risible	

At lower and of Below lower and Nearer umilious Just above sternum of sternum umbitious

On sternum

On sternum

Position of middle point of body

----

hymen may be taken as positive proof that the woman has never been delivered of a nearly mature child Obviously, however, no conclusions can be drawn from the absence of the signs of virginity

If the signs of recent delivery and virginity are both

absent, the other chief signs to be looked for are -

- 1 Presence or absence of the line albicantes and condition of the breats—The presence of the lines and albicantes may, however be accounted for by causes other than delivery eg ovarian tumours, or ascites, and they may be absent in women who have been more than once delivered Enlargement of the broasts also may be the result of causes other than pregnancy
- 2 The condition of the posterior commissure.—This, if ruptured, strongly indicates a previous delivery. If intact, the indication is strong that the woman has never been delivered of a child, and still more strong that she has never been delivered of a mature child?
  - 3 The condition of the uterus.—After delivery, the uterus does not wholly return to its original condition. The chief changes observable are as follows —
  - (a) Its cavity becomes larger According to Dr Barnes,<sup>5</sup> the vertical diameter of the cavity is, in Virgins 180, in women 2 20, and in mothers 2 44 inches, and the transverse diameter of the cavity, in Virgins 0 60, in women 1 08, and in mothers 1 24 inches
  - (b) Its walls become theker and its weight greater According to Dr. Barnes its weight in guils at the age of puberty, is \$50 to 1000 grans, whilst in women who have borne children its weight ranges from 1200 to 1800 grains. In advanced life, however (and in exceptional cases, in adiabit life after delivery), the uterus undergoes atrophy, and in old women its weight may become reduced to 100 to 200 grains.

On the whole, although the conditions of the uterus may afford strong indication of a previous delivery, no absolutely certain conclusion can be drawn from its state

The question "Has this woman ever been delivered of a character and it is as arise in defamation cases and in cases of disputed adentity. In the trial for murder, R v Wainwright, cited below, this question area with reference to the identity of the remains discovered and alleged to be those of a certain female who was missing. Trom the opinion expressed by Dr Meadows in this case, it would appear that, in the

<sup>&</sup>lt;sup>1</sup> Taylor, Med Jur, II p 162 <sup>2</sup> Tidy, Leg Med, II p 138 <sup>2</sup> Dis of Women, p 32

absence both of the signs of recent delivery, and of those of virginity, no certain answer can be given to this question 1

Case—Signs of previous delivery in exhumed coppe—The prisoner was treaf for the number of a woman with whom be had conshitted, and who had two children by him the last being born about nine months previous to the time of her supposed number. A year after her disappear ance the mutilated remains of a fernale were abscovered buried in premises belonging to the prisoner. Examination of these showed the uterus to be enlarged and faccid—its walls were unusually tim. There were one or two white lines in the skin of the lower part of the abdomen, and other marks of a darker colour in the nagunal region. Two medical men who had examined the remains were of opinion that they were those of a woman who had borne a child. Dr. Alfrid Vesdows called for the defence was of the contrary opinion but stated that he believed it to be unpossible to decide this question in any case with certainty—R v. Wanneracki.

1 Taylor s Manual p 496

#### CHAPTER XIV

#### RAPE.

(See also Chap XI on 'Virginity and Defloration')

THE crime of rape is a felony punishable by imprisonment up o penal servitude for life, and formerly it was punished by astration and death As it is usually committed in the absence of witnesses the law admits the testimony of the alleged victim, but the medical evidence is essential, as a large proportion of the accusations are false charges

Definition of Rape. -- According to the law of India (I P. C, s. 375, and also according to that of England 1) rape, subject to certain explanations detailed below, may be defined as sexual intercourse by a man with-(1) any female (including his own wife) under the age, in India, of twelve? (in England it is thirteen), or (2) any female over the above-stated age, not being the man's own wife—(a) against her will, or (b) without her free consent, or (c) even with her consent, when this has been obtained in certain unlawful ways. The explanations above referred to are -

Degree of penetration necessary to constitute 'Rape'-In India, the rule on this point is laid down in the explanation attached to s 375 of the Penal Code as follows — Penetration is sufficient to constitute the sexual intercourse necessary to the offence of rape, and in the case of Reg v Ferroll (Bombay High Court bessions, February, 1879), Green, J. directed the jury that vulval penetration only was sufficient, under the law of India, to constitute rape (see Case below) without actual seminal emission In this case the prisoner was charged with rape on a child six years old. The child had not complained, and admitted on cross examina tion that she had not been hurt. The medical evidence proved there was no injury to the parts. The child was found to be suffering from gonorrhom, so was the prisoner It was clear that the penetration (if any) had been only vulval Green, J, directed the jury that this was sufficient to constitute rape, and the prisoner was convicted of rape — Reg v Terroll, Bombay High Court Sessions, February, 1879

Criminal Law Amendment Act, 1885 (48 & 49 Vict c 69, s 4) \* Act X of 1891, s 1

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Age of the Male accused -As already pointed out, it is an irrebuttable presumption of Linglish law that a boy under the age of fourteen is incapable of committing rape. In England, therefore, a boy under the are of fourteen cannot be convicted of this offence. The criminal law of India contains no special presumption as to the age at which a boy attains! potency, and becomes capable of committing rape. It, however, contains two general exceptions bearing on the question of age in regard to criminal responsibility, and applying to rape as to other offences exceptions are in effect (1) that a child under the age of seven cannot be held criminally responsible for his acts, and (2) that a child between the ages of seven and twelve can only be held criminally responsible for his acts if he has attained a certain specified degree of maturity of under standing (I P C 82, 83) Hence, in India, if the case of a boy charged with rape does not fall within one or other of these general exceptions. the question of the caracity of the secused to commit the offence is left to the court to decide according to the evidence produced in the case Thus, "in the case, Kureem Noorbae v Meun Noorbae (2 N A Rep. p 87), a boy of ten years was convicted for rape by the Court of Sessions, but the Niramut Adawlut, considering it unadvisable to admit his capability, viewed the matter only as an attempt '-- O Kincaly's Penal Code, p 177

Age of consent in Female—In Indian law sexual intercourse with a female of or over the age, of twelve, with her valul consent, is not an offence, but see p. 42. According to the law of Ingland, however, sexual intercourse with a female of or over the age of thirteen, but under that of consult with the part of the sexual region of the sexual re

Consent of the Fenale 18 invald under the following circum stances—In Indian law donesnt of a female to sexual intercourse suntor valid, and does not exculpate the secured, if the manner in which it has been obtained falls within (a) certain general exceptions of the Penal Code in regard to consent (see s 90), or (b) certain special exceptions in regard to consent to sexual intercourse emboded in s 876 of the Code, namely —(1) If it is given under misconciption of fact, and the man knows, or has reason to believe, it was so given (s 90) (2) If the woman by reason of twiscondiness of mind, or intercuition, is unable to under stand the nature and consequence of the act to which she consents (label 4) (3) If her consent has been obtained by putting her in fair of death or hard (s 376) (4) When the man superconsets hard hardment and consequence of the act which she consents (and on the consents of the

<sup>1</sup> Confer p 42 Bg Criminal Law Amendment Act, 1885, s 5, imprisonment with or without hard labour not exceeding two years may be imposed 7 In the United States of America the age of consent is 18.

agrees with that of India (see Case, below) (2) That, as regards exception 2, the law of England appears to differ somewhat from that of India, it having been decided in the case of R v Fletcher. In which a man was charged with rape on an idiot, that "a consent resulting from a mere animal instinct would suffice to prevent the act from constituting a rape ' By s 5 of 48 & 49 Vict c 69 however, sexual intercourse with "any female idiot, or imbecile woman or girl, under circumstances which do not amount to rape, but which prove that the offender knew, at the time of the commission of the offence, that the woman or girl was an idiot or imbecile," is a misdemeanour punishable less severely than rape (8) That the law of Fugland agrees with that of India in regard to exception 8 (4) That, as regards exception 4, it was ruled in R v Barrow (L R 1 C C R , p 156), that this is not rape by English law Since then, however, it has been enacted that a man who "induces a married woman to permit him to have connection with her by personat ing her husband' is guilty of rape (Criminal Law Amendment Act, 48 & 49 Vict c 69 s 4)

Case —Conviction for rape where consent was given under misconcery ton of fact I From Taily, Leg Mt, I, II p 244, R \*\* Hattery, L R 2 Q B D , p 140 — The privance, a quack doctor, professed to give medical and surgical advice for money. The prosecutiva, a guil of nine teen, consulted him a with respect to an illness from which she was suffering the advised that a surgical operation should be performed and under the preferee of performing it had carnal connection with the prosecutiva has a surgical control of the control of th

Cases of females compelling young boys to have intercourse with them are recorded by Chevers and Powell as having occurred in India, in which young boys hid, under compulsion, intercourse with their ayahs or other females Cases of this description, however, do not come under the definition of 'rape' laid down in the Indian Penal Code

Under the penal code of France, it is an offence for a woman to attempt sexual intercourse, with or without consent, with a boy under the age of eleven

'Age of Victim.—Young children are more frequently resistance, and as in India the practice of infant marriage creates a desire for intercourse with immature girls Besides an occasional motive for the rape is the old-world superstition, common both to India and Europe, that intercourse with a virgin is a cure for venereal disease, and the younger the girl the greater the probability of her being a virgin. The child-wives of India are still, to a large extent, the victims of rape

<sup>1</sup> L. R. 1 C C R. p 89, Tidy, Leg Med , II p 194

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at the instance of their maturer husbands, notwillistanding the Act of 1891, which raised the inibile age from ten to twelve years. For there is reason to believe that premensitual congress with children is still largely practised in this country under the cover of marriage.

The age in 905 cases of proved rape in Bengal during the three years 1871-78 there was one 2 years old one 2, hose 3, three 4, fire 5, mis 0, mis 7, eighteen 8 to enty-one 9, twenty six 10, muerteen 11, twenty 12, thirty between 12 and 15 and only indicted nabove 15. That is to say, 51 per cent were under 10 and 89 per cent under 15 years of age. In the year 1688 of 48 cases in Bengal in two the age was 6, in seventeen between 8 and 10, in ten between 11 and 15, in seven between 16 and 20, in three above 20 and in mise not stated—that is to say, about half of the victims were under 10 years of age, and in most of the cases the children were budly with

#### OUGSTIONS IN RAPE CASES

1 Can a man unaided commit a rape on an adult female of ordinary strength, in full possession of her senses?-It has been alleged that this is impossible. That, however, in exceptional cases, rape may be committed under the circumstances stated, is shown by the case below, reported by Casper, who, in regard to it, remarks "The interest of this important case cannot be mistaken for it shows that a healthy, powerful woman was certainly completely violated by a single man"1 Ogston also, in reference to this question, remarks that the arguments advanced against the possibility of intercourse under the circumstances stated, "apply rather to the case of entire penetration of the vulva, than to the nartial entry, which is now admitted in law as amounting to the crime of rape That such entry may be forced in an ordinary case, I had the assurance of actual fact in at least one serious case "2 Chevers, agran, gives two cases in which rape was effected by unaided single men on adult females. Of course, the younger and weaker the female, and the stronger the man, the greater the probability of the commission of the offence being possible, Case p 301 illustrates this A very old woman also may be incapable of offering sufficient resistance. Chevers mentions a case in which a man committed a rape on a woman of seventy

Cave.—Rape by one men unsided on an adult fermalo (from Carpers & Handlooh', No 'I'I, p '91)) —"h. permindic', a gift seed' viewly 'nrv. to accompany him to the Trergarten in the dark and after be had been builted by her struggles in his endeavours to violate her against a tree, he seized her round the body and fung her on the ground and being now, as she states depraved of the ponce of resistance, he fings dress over her head and violated her. Nine days subsequently I had to

<sup>1</sup> Casper, IIL p 311

<sup>\*</sup> Lect. Med Jur . p 120

examine her She was deeply moved by what had befallen her The entrance to the vagina was still reddened, and painful when touched and dilated, the hymen was completely torn, and bright rid, caruncules still slightly swollen, were rusble the fremulum still ensisted. Without any leading question, and only in answer to general quenes as to her bodily and mental condition, she declared that still a little, and several days ago much more, she could only with difficulty walk and pass trine and faces. After carefully considering all that required to be considered in such a case, I came to the conclusion that a rape had scitually been committed upon F. At the time of the trial, circumstances came out committed upon F. At the time of the trial, circumstances came out hurned by at the circumstances came out to the conclusion of the conclusion been thrown was hard frozen and they deposed that L. when arrested, and after his lust had been satisfied was still in a condition of actual satyrasis.

Cate — Rape by one man unaided on a married girl ef sixteen — Tadil Garee, of Jessore a tall and powerful man seeing a married girl of six teen standing at her door accosted her apparently under the pretence of asking for a soot nulfee and wished to worm out of her if she was alone, finding that she was he put his arms round her, forcibly drew her into the house, fluing her down, and, gagging her mouth with her right hand freeted a criminal connection with her. Before her mouth was well gagged she managed to yell out for assistance and her cries I rought her mother and a neighbour who found him in the act. He then got up hastily, offered to give her a rupe of she woull say nothing more of the matter, and ran off — Charles Met Jur p 702

2 Can a woman during sleep be violated without her knowledge?-A woman can undoubtedly be violated without her knowledge while under the influence of narcotics (anosthetics, also alcohol) or during syncope or coma, and it has been alleged, with reasonable possibility, during mesmeric trance (see Case below) It is probable also that, in exceptional cases a woman accustomed to sexual intercourse may be violated during profound natural sleep. Guy, in support of this view, mentions the case of a woman who, in illustration of a symptom which somewhat alarmed her--viz that her sleep was unnaturally heavy-told him that her husband had assured her that he had frequently had connection with her during sleep 1 On the other hand, it is highly improbable that a virgin could, during natural sleep, be violated without her knowledge, or even that, without her knowledge, sexual intercourse sufficient to constitute rape could be effected with her Cases are reported where it is alleged that this has occurred (see Cases below), but it may be. 'Non omnes dormiunt qui clausos habent oculos!"

Case —Alleged violation during mesmeric trance —"A girl (at eighteen) consulted a therapeutic magnetizer as to her health She visited him daily for some days. Four and a half months afterwards she discovered that she was pregnant, and made a complaint to the authorities.

<sup>1</sup> For Med, 4th ed, p 57

against the magnetizer. They directed a physician and surgeon to deter mine the date of her pregnancy, and whicher complianant might have then been violated and rendered pregnant contrary to her will, or if her volition could have been completely or partially annihilated by magnetism. The midical inspectors were estisted that the pregnancy did not ext not further beck, than four and a half months and founding their opinion on M. Husson a report, made to the Academy in 1831, conclusied that, as a person in magnetic sleep is insensible to every kind of torture, sexual intercourse might then take place with a young woman extitut the participation of her will, and without her being conscious of the act and her. This opinion was confirmed by that of Detergie (Gazette Médicale de Paris, and Lein Month, John Josepher, 1850, n. 663.

Guse—Alleged violation during profound natural sleep—A strant woman at an hotel in Nenaph proted pregnant and solemnly declared that she was not conscious of having had intercourse with any man. Suspecion however, fell upon an oster in the establishment, who subsequently acknowledged that he believed he was the father of the child, that, having found the woman ma deep sleep from fatgue, caused by long continued exertion and being kept out of bed two or three nights in accession he had connection with her, and as he believed, totally without her knowledge, as she did not evince the slightest consequences of the not at the time or recollection of its occurrence afterwards. The parties were married with mutual consent—Ogston, Mcl. Jur. Leet, p. 121

- Case—Another case—Casper met with a solitary cas, in which a girl, of sutteen, accused a man of having had intercourse with her while she was sleeping in her be I of which she was not concious intil he was in the act of withdrawing from her. On her own statements she was surgo salazed up to the date of this occurrence. Upon the facts of the case Casper came, to the conclusion that if her statement was true, the man could not have had intercourse with her without causing pain and rousing her to a consistency courses of her position. The hymen was not destroyed but presented lacerations in two places. Thus and other facts showed that there had been intercourse, but this did not prove that this had take no provided the present of the woman—Taylor, Med Jur, II p 445.
- 3 May pregnancy follow rape?—It was formerly alleged that pregnancy neer followed rape, and that hence if a woman charged a man with committing a rape, upon her, and became pregnant as a result thereof the charge must be untrue, and the woman must have constituted to the intercourse. Impregnation is, however, independent of volution on the part of the female, and hince pregnancy as is proved by more than one recorded case, may undoubtedly follow rape.
- 4 May rape cause death?—The introduction of the mature male organ into the vagina of an immature female may, produce local injury sufficient to cause death from hemorrhage, is shock, or subsequent inflammation, such as peritoritis or gangrene, by violent liceration of vagina or pernerum. Such a cause of death was not uncommon amongst the child-wives in

Bengal up till at least 1890, when a notorious case (see below) attracted medical notice, and led to the Act raising the nubile age from ten to twelve 

Lyen now cases of this kind doubtless happen not unfrequently and are concealed, the death being attributed to other causes Chevers mentions 14 cases of death from this cause, and Harvey 1 records that in Bengal, in the three years ending 1873, out of the 205 cases of rape which were proved, in 24 of these laceration of the vagina, generally of the posterior wall, was found, and in 14 the perincum was torn, the rent varying from one fifth of an inch to one inch in length. Five of these cases terminated fitally (see also Case below) Injury to the genitals of a young female may, however, be caused in order to support a false charge (see Case, p 309) Violent sexual intercourse in a young female at or near the age of puberty, may cause constitutional disturbance, leading to fatal hemorrhage into the brain, peritoneal cavity, etc On the question whether death may result from nervous exhaustion, the result of repeated intercourse, Chevers cites the case of certain Marquesan women, who boasted apparently with truth, of having had intercourse with one hundred men in one night The intercourse, however, was voluntary, had it been otherwise, no doubt the exhaustion would have been greater.

Case —Rupture of Vagina in girl wife by sexual intercourse —In 1890 at the Calcutta High Court a fully developed Bengali, aged 35, was charged with causing the death as above of his child wife, a girl aged 11 years and \$1 months Medical evidence testified that the girl, although well developed for her age was immature, had not attained puberty, and was wholly unfit for sexual intercourse The injury inflicted was a rent of the vaginal wall on the right side of the os uters, measuring 17 inch in length and 1 inch in breadth Copious hæmorrhage took place imme diately after intercourse The girl died of exhaustion 131 hours after the act The yagina was found to be distended with a clot measuring 3 inches in length by 11 inch in breadth, and there was a globular hæmatoma in the right broad ligament, measuring 8 inches in diameter The mucous surfaces and internal organs were exsanguine, the uterus was infantile, and ovaries showed no sign of active ovulation. There was no sign of injury of the labia or vulva, and no trace of hymen These circumstances were held to indicate that sexual intercourse, more or less complete, had taken place on previous occasions The wall of the vaguna was thin and showed no ruga. The evidence in this case clearly established the fact that the fatal injury was caused by the sexual intercourse of this mature male with an immature female, his wife. The court held that when a girl is a wife and above the age of consent (which at that time was only ten years), although it is therefore not rape, still the husband has not the absolute right to enjoy the person of his wife without regard to her safety Found that the prisoner caused the death of the girl by a rash and negligent act.—Queen Empress v Hurry Mohun Mythee, I L R , 18 Cal 49 , J. Wilson, July, 1890

Bengal Med Leg Rep , 1870-72, pp 179 et seq

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Case — Death following rape.—Rape on a female at mine Death from inemorrhage from a woundon the genitals ascended to the introduction of the male organ. The left wall of the vagina was ruptured from the ordice upwards for 21 inches and the rent was an inch wide—Int Med Ass. November, 1875

On the other hand it has been held to be physically impossible that a girl of tender age should be killed by any violence in rape, and not show external signs of violence (Queen v. Banee M. Mookerjee, 1 W. R. 29, November 22, 1864)

Rape on the dead.—It is necessary to find in such cases whicher the female ded from assault combined with rape, or was violated afterwards The direction of the flow of blood will give indications In cases of young children it is probable that rape was first committed and murder afterwards In older temales it is probable that they were murdered first and violated afterwards

whose death was not from injuries proluced, but from sufficient on by comted matter entering largin by the volence offered Locally three were too lacerations in vagina in addition to exconation of abdonies and blood on the external genuits. The most conclusive excretionsfarial cridence as the knees of the prisoners strousers were solided with mid corresponding to that of the place where the assaults was committed and addition to them was some red coloured woodlen fiber resembling that of the fabric of the woman's petitional. Although presioner averted that the woman consented he was found guilty—Carlisle Summer Assires, 1889.

Cases - Rape on Dead -(a) P v Kerr Charged with rape on woman

(b) St. Ayr Case — I emale killed first and raped afterwards.—Sir Jas Stephens frim I aw of England, 345 f

(c) Léotade Case — The body of the girl borê marks of a violent attempt at rape which was unsuccessful because the girl was not mature In addition was violence to her head by a broad blant instrument — Id., 318 f.

#### EXAMINATION IN RAPE CASES.

As neither the complainant nor accused can be compelled by a magistrate or any one else to submit to being examined (without being guilty of and running the risk of a charge for indecent assault), the medical man must invariably, and inthe precence of witnesses obtain the consent of the person in question to make his evanuation, and at the same time feution the persons that the results of the examination may be used as evidence against them. Where the victim is under age, the consent of the nearest guardian should be asked. If a woman refuses to be examined it is probable that no rape has been committed.

The evamination will comprise (1) Examination of the victin or complainant (2) The accused, and (3) Stained linen worn by the parties at the time, and (4) The spot where alleged crime was committed

### Examination of the Victim.

Having obtained her consent, and in the presence of a third person in order to avoid false charges being brought against you, commence in a good light, to make your examination, after note down in writing the following points 1—

Preliminary I ramination -

- Date and exact hour at which she visits you
- 2 Her walk and mental state
- 3 Who accompanies her and their attitude towards accused
- 4 Her statements
  - (1) Age
    (2) Date, time and place of alleged offence.
  - (3) Exact position of parties,
  - sitting, standing etc
    (4) Did she cry out or strug
    gle?
  - (5) Was she sensible the
  - whole time '
    (6) Menstruating or not

Examination of her clothes.—Then let her be undressed, in such sections as are required, by some other person, and note if stams of blood, semen mud etc, are on her clothes The clothes may be found torn or stamed with blood, and

4 Screaming out does not neces sarily imply want of consent when it is done only when discovered by a third party in a compromising position

 With reference to lapse of time since alleged rape. If long

delayed why? as traces may disappear in 3 or 4 days

Referring to pun emotional state, alcohol, etc

3 Referring to concorted tales

Modified after F T Smith Wed Jur, 192

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marks of blood may be found on the person. Of course, in such a case, the question will arise whether the blood is menstrual or not. As already pointed out stains of menstrual blood cannot be distinguished from stains of other blood, by inquiry however it will have been ascertained whether or not the female was menstruating at the time of the alleged commission of the offence. If the female is seen soon after the alleged rape the discharge from the vagina if a discharge exists or the vaginal mucus abould be examined for the presence of spermatozoa (see below). Spermatozor may even be found in the vaginal mucus ten to fourteen days after rape. Stains containing spermatozoa may be found on the clothes, but it must always be recollected that the non discovery of spermatozoa does not prove the absence of semen

#### Seminal Stains.

The examination for seminal stains is made in connection with cases of rape and unnatural crime though in neither off these is the detection of semen essential to the proving of the crime for the actual emission of semen is not necessary for legal conviction

Characters of the seminal stain —(1) Semen stiffens cloth like starch and is of a light greyish yellow colour, pus and several other discharges stiffen cloth in a somewhat similar manner (2) The characteristic odour may be given out on moistening the stain if the cloth is otherwise sufficiently clein (3) Presence of spermatozoa. This is the only positive and trustworthy test for samen but it is essential that one or more should be seen in a complete form with filament attacked

Mode of examination —If taken direct from the vaginal muous a drop of the latter is placed on a slide and covered with a time over glass and examined with a power of 300 to 400 diameters. If dried as upon a garment or hair the examination is more difficult see below also Hankin's method in Appendix (IX, which is specially adopted for tropical conditions

If the sensen has dired on a fabre or on har (the part of female undervioluting most blady to contain sensen has the back and foots of all carefully separated without breaking from the material to which they I are been given down by the draing of the radiuminous fluid Tor this the star is fould be hailful as fulfile as possible on I lyre flat during the softening. A weak solution of hyterhibric soil one deep to 4 to C. C. Taranta, January 1. The start is gloring solution to

avoid undue swelling A few drops of this solution is put into a watch glass with a fragment of the stained cloth, which latter is so placed that its lower end dips into the fluid and is allowed to soak for a few minutes to several hours, according to the age of the stain. When the softening is complete, the fragment of cloth is removed by forceps and gently dabbed on the slide to shake out the spermatozoa, the mark or deposit thus obtained is covered with a cover glass and examined microscopically As the spermatozon are very translucent they may be made more apparent by being stained The simplest way of doing this is in the moist way, combining the staining and softening solutions in one A solution of methyl green 0 15 to 0 3 grain in 100 c a of water to which 8 to 6 drops of hydrochloric acid is added is to be used as above described, but the fabric must steep in it for several hours By the dry method double staming of the deposit may be made by eosin and logwood (Fried inder s) or by eosin \ and methyl green, whereby at the base of the head of the spermatozoon is a hemispherical portion which stains green while the anterior part and tail stain red

Characters of Spermatozoa. These are minute bodies with an oval or pear shaped transparent head (which strongly refracts light posteriorly) and a long slender tril Human spermatozoa have a flattened, almost oval head, and vary in length from  $1_0^{1}1_0^{1}$  to  $s^{1}1_0^{1}$  of an inch, the head being about  $s_0^{1}1_0^{1}$  of an inch in diameter (see Plate IV,  $\Gamma$ ig a). It is not easy to recover spermatozoa from stains on cloth even from spots of undoubted semen Careful search should be made in several specimens of the For sometimes the seminal fluid contains numerous sper deposit matozoa at other times only a few and frequently they are at times absent from the seminal fluid even of young healthy men Hence, while the discovery of spermatozoa in a stain is positive evidence of its seminal origin, their non discovery does not enable you to swear that the stain is not semen When a seminal stain is mixed with much blood or the clothes are very dirty, the detection of semen is especially difficult Monad animal cules and threads of fibrin or broken pus nuclei in the stain preparations must not be mustaken for spermatozoa

## Characters of Vaginal Monad Animalcules.

Powell has found Trichomonas vaginals in about one third of the rape cases brought for medico-legal exmination, when there is sufficient vaginal secretion to make a moist cover glass preparation. He has kindly contributed the following important note of his methods.

"The animal is pear shaped (see Fig 2 Plate IV) about two to three times the diameter of a red blood corpused (16 to 20p.) Its power of locomotion under a cover glass is small, but its rotatory move ment and the lashing of its flagella are so active that it is extremely difficult to count the latter. If the light from the condenser be partially sult off the presence of the animal is readily detected by the commotion of the neighbouring pus-cells caused by the lashing flagella. At the pointed end of the pear shape I oldy its a short, stiff rod. At the opposite end are three flagella, sometimes a flagellum trails backward along the edge of the undulant membrane. There are no citize as a described by

SOS RAPE

Domit and figured in Taylor's, Dicon Mann's and other text books formatimes a small notch or a link in the undulant membrane may be seen close to the flagella. In this notch or mouth a particle of that of debris may lodge and give rise to the impression of chin. The body is granular, of the same colour as the pus cells possesses a nucleus and sometimes a vacuale hite spot. Though fairly expert in the technique of fitting and staining Tagellates, I have never succeeded in staining one of these persuits. In a few cases I have found in the vagena a smaller mound 7-10µ in diameter with only two flagella. The size of these difficulty in staining and the fast that they break up and see an recognizable in dry smeurs must prevent any one mistaking them for spermatozon.

Examination of her person.—Note her physical development, with reference to power of struggling etc, and any brusses or scratches with reference to possibility of self-infliction

Creatches, finger marks, bruises or wounds, may be found on parts of the body other than the genitals, and the more the registance officed the more likely are such marks to be found. Hence, therefore, such marks are likely to be more sumerous if the subject is an a lift female, and less remercions of a child. Even, however, in the case of an adult female, as may happen if the offices was committed while the was uncenshed or if, several presons combined in the assault, some bolding the female, or even where one man only has been concerned in committing the offence when the woman has been nearly sufficeated by her clothes I englished with the woman has been nearly sufficeated by her clothes I englished to reven the woman has been nearly sufficeated by her clothes I englished may not may be found on the mouth or throat

Sometimes violence employed for this purpose results in death from suffication. Thus Chevers mentions a case where the husband of a young girl, in order to stille her crew during first councition, bound a cloth over her mouth, and after intercourse found her to be dead. In a crew which exame before the Bornbay Chemical Analyzer soffice, it was reported that "deceased had been violated before death, and that the cause of death was sufficiention, produced by the foreigh untroduction of

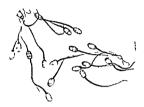
earth into the mouth and windpipe

Then examine the genitalia for signs of loss of virginity and often injury or disease, noticing first the hairs on pubes, whether matted or stained, cutting off a portion of any such for microscopic examination, also whether any brusing, redness, or swelling of the rule a and any discharge from the ragina

1 Signs of loss of virginity.—These are obviously only available as evidence of rape in cases where the female was virgo undada previous to the commission of the offence. The hymen as this is the most reliable sign of virginity, so rupture or laceration of this membrane is the chief sign of defloration.

<sup>1</sup> Med Jur p 605

a



HUMAN SPERMATOZOA × 900



TRICHOMONAS VAGINALIS (Donné)
(Drawn from life by Prof. A. Powell.)
Scale | = 16-23 m

[To face p. 808

available as evidence of rape, the various other signs of virginity being, as a rule, not lost as a consequence of one intercourse Recent lacerations of the hymen are "sharp edged, fresh looking and tender". And when rupture of the hymen has recently occurred, the carnicular myrtiformes are found swellen and tender, also in recent defloration, especially if due to rape a hot and tender condition of the gentials accompanied by pain in wilking and pain and difficulty in passing urine and consisting the state of the state

Laceration or rupture of the hymen may, however, occur independently of sexual intercourse viz from the introduction of foreign bodies other than the penis Rape, again, even in females over the age of puberty may be unaccompanied by injury to the hymen and as already pointed out, in very young children the hymen is not usually even lacerated by sexual intercourse. On the whole therefore, the presence of signs of recent injury to the hymen is to a certain extent evidence but by no means conclusive ovidence, in support of a charge of rape. The evidence however, in favour of rape becomes stronger in proportion as the signs of local and other injury are greater. On the other hand especially in young children the absence of injury to the hymen cannot be taken as negativing the supposition that rape has been committed.

2 Other myury to the genitals.—Rape by an adult on an immuture femile usually causes a considerable amount of local injury. The injury may amount simply to bruising but frequently laceration of the pirts results, and these locerations may be extensive and severe enough to cause death. Severe injuries may be followed by inflammation and sloughing of the parts. Again injuries to the genitals of immature females resembling those resulting from rape, have been caused by the introduction of foreign bodies other than the penis with the object of rendering them apilar wirts, or in order to support false charges (see Case below)

Case—Injury to the genutals of a young girl for the purpose of supporting a false accusation—A procures brought a girl into the officers barrack Fort Wilham Calcutta but the person to whom she was presented objected to the girl on account of her youth. The bawd having been disapp omted of her fee injured the girl so as to cruse very considerable hemorrhage from the genutal organs. The girl was seen by an assistant surgoon in the fort, and the circumstances of the case having been reported to the police it was discovered to be a conspiring against the officer to obtain money. The child recovered—Chevers, Vied Jur., p 701 from the Mcd. Times and Gas. May 21 1850

In females who have reached puberty, laceration of the genitals may be found, if the disproportion between the size of the organs of the parties is great, or if much violence has been used. In adult females accustomed to sexual intercourse. lacerations are not likely to result from rape alone however, are reported where fatal laceration of the centals has been produced in adult females after violation, by forcing forcign bodies such as sticks into the vacina. Bruises. scratches, and marks of violence other than those caused by the introduction of the penis, may be found on the genitals, especially in adult females, but may be absent. On the whole, the presence of marks of local injury to the genitals is, to a certain extent evidence in support of the supposition that rape has been committed On the other hand-except when the subject is an adult female accustomed to sexual intercoursethe absence of such marks is strong, but not conclusive evidence against the same supposition

Gate—Post mortem appearance of noma pudends in a gul aged five—

"The gental organs externally and the skim sround and beyond the anus, were, intenselv inflamed, swollen and ubcerated, and in an approach ing state of gangenee or sloughing. The hymren was destroyed posteroty, and the luming membrane of the vagina and uterus was much inflamed, of a dark purple colour, with softening and disorganization of substance. The upper inguinal glands were enlarged on both sides. The child was in aprefected and durfy state—Taylor, Med. Jur., IL. p 432

3 Signs of infection with disease.-Many cases of rape by adults on young children owe their origin to a popular belief that sexual connection with a virgin is a cure for venereal disease, and there is no doubt that in this way female children are infected with gonorthus a disease readily communicable to Ogston 1 mentions the case of a man who, while affected with gonorrhan, had connection with four female children, communicating the disease to three of them Female children, however, may become infected with gonorrha a without intercourse A case is recorded in which two girls, at respectively one and four years became infected with the disease from using a sponge which had been used by a female suffering from it. It is, however, not easy to distinguish non-syphilitic from syphilitic cores, or a gonorrheal discharge from a muco-purulent discharge, arising from worms, etc., in dirty or delicate children, but it can be so distinguished (see Case below) Adult females are liable to leucorrhors which although usually a mucous discharge, may become, like gonorrhea, muco-purulent owing to ulceration of the vagina In adult females, also, it must be noted that the existence of syphilitic sores or of

<sup>1</sup> Lect Med Jur , p 96

<sup>\*</sup> Med Gaz , Vol ALVII p 141

gonorhaa, only proves impure connection, not rape Tho period of incubition of syphilis, or of gonorrhea, may have an important bearing in a case of alleged rape. This in gonorrhea varies from some hours to three or four to twelve days, and in syphilis from fourteen to forty-five or more days. Hence, if a female is seen within a few hours after an alleged rape has been committed, and is found to be suffering from a profuse discharge, or is seen within a few days, and is found to be suffering from syphilis, the presumption is strongly against the discuss thing been committed during the intercourse represented as a rape. It should further be noted that infected individuals do not necessarily by intercourse comminicate either gonorrhea or syphilis

Cure — False charge of Rape — 'S, gui of 18 charged three haching durvers with raping her the previous inplt. She professed to have been a virgin up to the time of the alleged rape On examination, I found a profuse and chronic gonorrhea The hymen was represented by mere caruncles None of the three accused then or a week later had any sign of gonorrhea' — Prof Powells Reports, 1917

Cases—Dr Powell cites a case (In I Med Gas, 1902, p 232) where he knew four men to have connection with a woman suffering from a copious genortheed discharge, and only one was infected, and in another case out of seven troopers only two of them were infected. Mr Hitchinson estimates that probably not once in a hundred acts of coition with a syphilitic partner is a chance contracted.

In the case of rape on young children, however, there is greater likelihood of inoculation on the freshly torn surface

The discharge should be examined microscopically with the requisite stains for the detection of the gonococcus of Neisser 1

If the accused be suffering from gonorrhea, the vagina of the complannat should certainly be scarched for spermatozoa and gonorrhead pus as soon as possible Here, as recommended by Dr A Powell, a douche should be given and a second examination for pus and genococcunade an hour or two later if gonococcu be now abundant, on the day of the sileged rape, they cannot be due to that at: A third examination should be made at the end of a week If gonococcu or the softs sore be now present, and had existed on the prisoner at the time of the rape, the evidence will be of value

When examining for gonococci it is well to take two slides. One is stained with methyl blue, the other with amines violet, and examined in xylol under a cover glass. If preferred the Grain stained slide may at once be counter stained with Bismarck Brown, in which case the gonococci will be brown. The position of some diplococci is then noted and marked with a finder, Grain a process is then completed. If the cocci be gonococci they will be decolorized. The civil surgeon in Indias is not

Doubly have been expressed as to the pathognome value of the genococcus Thus, Morrow (Genito-Urinary Diseases) address the cases of six raped girls in which a pseudo genococcus of diplococcus was found, which was morphologically and bacteriologically identical with the genococcus of Neisser, but mose of them suffered from genorrheas

likely to have serum culture maternal at hand, but he may inoculate agar tubes Should diplococa develop they cannot be gonococci. In the intertings of children, due to dirt, the staphylococci, albus an I sureus are most commonly foun! In discharges from the vagina, bacilli of the colon type are common!

Case —Gonorrhoeal infection in Sodomy—Dr. A Powell relates —
In a case of sodomy I examined the catamite, a boy eight years of age,
about an heur after the occurrence. There was a slight recent tear near
the arms which was surrounded by pus. The boy had no ulter, aboves,
or dysentery to account for the pus which contained gonococci and a
remarkable large proportion of edimophile leucocyte. The accused had
gonorrhora in the discharge of which there were gonococci and a similar
unusual proportion of cosmophiles. The next day the boy had no dis
charge from the amps. A little clear exudation from the tear showed
no unusual character in the leucocytes.

To recapitulate—To distinguish between a genorrheal discharge and a muco purulent discharge, note (1) profusion of discharge, (2) presence or absence of genococci, or B coh communis, thread-worms or their or 1, (3) duration, (4) response to cleanliness and treatment—prompt in 'dirt cases, slow in gonorrhea, (5) locality—arethra often inflamed in genorrhea, seldom in other, (6) co existence of cezema, often in 'dirt'

4 The age of the vacum of alleged forcible intercourse may have to be determined especially as nearly nine tenths of the cases of rape in India are on children and the question arises whether or not she is under twelve years of age, so as to be capable of gying consult to the act, or if she is under axteen with reference to abduction of a minor for immoral purposes. In Eugland the question of age would be (a) is she under thirteen, or (b) under sixteen? The following recent case well illustrates how the examination of an alleged victim of rape should be conducted and reported—

Cate—False charge of rape and venereal infection—in 1901 a gith, aged 10, and her mother binaged a wealthy of iman with the rape of the former, and with infecting her with genorchus. She was brought by the police for examination by Dr. 4 lowed, three days after the alleged rape. The child is in a poor condition and very dirty. Here are no signs of breauing or injury. There is a slight muce purified duckarge from the vulva and vagma. The brunen is algibit anollen of normal colour, circular with a messal oral opening. There is no later or abrasion. The opening will not admit a 3 inch glass red without tearing or duly stretching. There is a later of abrasion of the colour highest account of the colour ship of the colour which are pointed out as blood stains due to tearing in the act of intercourse. The stains do not give the greatened when or the colour which are pointed out as blood stains due to tearing in the act of intercourse. The stains do not give the reactions of blood. Though dry they are not staff. Under the microscope they are seen to contain starth.

cells, spiral vessels, and other vegetable structures, as well as numerous ova of the thread worm. The discharge from the vagina contains no spermatozoa, pus cells are numerous, there are no genococci, many short bacill of a colon type, a few staphylococci which all retain the stam after Gram's process. Ornivo.—The child has what are usually considered the signs of virginity. I considered the signs of virginity. I considered the signs of virginity. I considered the signs of virginity. I considered the signs of virginity. I considered the signs of virginity. The child has a discharge from the private parts but I am of opinion that it is not venereal in origin as the germs usually found in genoritoes are absent. Similar discharges are, said to frequently arise from the irritation of dirt or worms. There is evidence of the presence of numerous eggs of vorms. The child is dirty and has an eruption, such as would be caused by dirt or an irritating chemical such as was found on her thights and drawers. The stams alleged to be of blood are not blood they are human frees. The discharge from the skin and the private parts is a chrome one and must have existed for some time.—The accused was released

#### Examination of the Accused.

This should ascertain —(1) His age and capacity for committing the offence, (2) whether his clothes or person exhibit signs of recent sexual intercourse or a struggle, (3) whether he is suffering from venereal disease

Age and potency.—This is ascertained as already described. As regards age whether he is under seven) or under twelve (p 42), and as regards impotency see p 261, also his muscular development

Signs of recent intercourse.—Glans If this be covered by uniform layer of smegma, it negatives the possibility of recent complete penetration If not, any abrusions should be noted, especially on freatum

Stains on clothes or person.—The presence of semen on the clothes or person of accused is only evidence of recent emission and may have an innocent explination, or have been in connection with another woman. The presence of blood is important if the alleged victim is a child or virgin, but the stains may have been removed by washing before your examination. It is of the naturest importance in man exacts that the police should not allow the accused person to retire to a water-closet on any protext before the surgeon has made his examination.

Case—Dr A Powell relates —A menstruating woman accused a neighbour of rape He was arrested in her room, but allowed by the police to wash himself On examining him I found no trace of blood on his private parts. He quite frankly admitted intercourse but with

<sup>1</sup> Ind Med Gaz , 1902 231

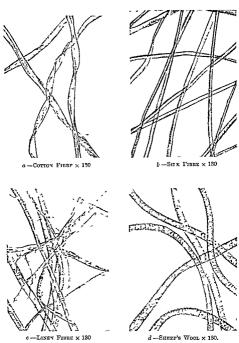
RAPE RAPE

cons.nt He stated the woman only cried out when some friends attempted to enter the room. He added that his penis and hand were covered with blood when arrested, and it was for this reason he went to the latring and washed.

Stains of mud, etc., derived from the spot where offence is alleged to be committed should be looked for Any scratches or bruses on his body should be noted with reference to a struggle

Signs of venereal disease.—If the accused is suffering from teneral disease his discharge should be at once extrained and the character of the pus and any organisms therein compared with any found then or subsequently on the victim (see Case, p. 312), and at the same time the presence in it or absence of spermatozon can be ascertained

The Spot where the offence is alleged to have been committed may show signs of a struggle having taken place or there may be blood marks on it, or an impress of the body of the female on the ground



(From Micro Photographs by Dr H Gibbes ) (To face p 314

## CHAPTER XV.

# CRIMINAL ABORTION OR MISCARRIAGE— FOETICIDE.

Criminal Abortion or Foeticide is undoubtedly very prevalent in India, though only a relatively small proportion of the cases come into the law courts usually those cases only where the results have proved fatal to the mother, as prosecutions are beset by obvious difficulties and convictions are extremely rare Amongst Europeans in India cases often occur in medical practice where hemorrhage, paralysis, and other symptoms are obviously due to the clandestine use of abortifacients frequency of this dangerous and immoral practice amongst Furopeans in India an experienced Anglo-Indian physician writes -"I am afraid that in India inducements to procuring abortion criminally are frequent and strong and I have known instances in which solicitations in that direction have caused medical men to swerve from the path of rectitude, but apart from considerations of personal reputation and professional honour, the blunt truth should never be forgotten that feeticide 18 murder, and, if fatal to the unfortunate mother, double murder"

Criminal abortion or 'causing miscarriage is unlawful expulsion of the fectus. The term 'miscarriage,' as used in law, includes both abortion and premature labour. Medical writers, however, restrict the term 'premature labour' to denote premature expulsion of a child that has attained viability, and use the term 'abortion' or 'miscarriage' to signify expulsion of an ovum or fectus at an earlier period.

Miscarriage may be—(1) Accidental, ie the result of natural or accidental causes, (2) Justifiable, ie the result of a lawfu' act, or (3) Criminal, ie the result of an unlawful act

# Accidental Miscarriage.

This frequently occurs, and is more common in the  $e_{\mathbf{m}}^{i\mathbf{r}}$ 

observation of 2000 pregnancies, estimates that one in seven end in abortion. Dr. Robert Barnes divides the causes of accidental or natural miscarriage into (1) Maternal, and (2) Foctal causes, and classifies them thus—

Material causes—(1) Poscois curclinting in the mother's blood ion introduced from without, as levers, applials, ranous gases, lood, copper, etc., (b) products of morthal action, as paunition, alternative actions and from asphyram, and in the morbinid (2) Discusser in povers-thing the blood, e.g. america, obstinate vomiting, over lactation (3) Circulatory disturbance, e.g. luva, heart, and lung discusse (4) Revrous troubles (e) certain merrous diseases, as chorac etc., (b) mental shock, (c) diversion or exhaustion of nerve force, as from obstante vomiting (5) Local diseases (e) uterine discusse, as fibroid timours, inflammation, hypertrophy te of the uterine microus membrane, (b) mechanical anomalies, as retroversion, pressure of timours external to uterus, etc. (6) Artificially induced shortion

Feetal causes — I) Diseases of the membranes of the overm, eg fatty degeneration invlatutions depeneration, inflammation, congestion, apoplexy, and fibrous deposits (2) Also diseases of embryo istellimization inflammation of serious membranes, disease of nervous system, diseases of kidneys, liver, etc., and mechanical, as from torsion of the cori

Common causes of acadental miscarriage are syphilis, mental shock, and accidental violence. In some women miscarriage results from the slightest exciting cause. Others having once miscarried, miscarry in subsequent pregnancies apparently without any exciting cause. Others, again, seein "proof against the more severe physical injuries and suffering and the most violent mental excitement."

f ane.—Failure of external violence to cause miscarriage.—In the Assire Court of the Lore Inferieure it was proved that a peasant who had so duced his servant and wished to make her abort, mounted on a string horse, and put the gift on the same horse, then galloped will be hither and thither, throwing her down on the ground whilst in full gallop, and this repeatedly. Having trad this time without success, he applied to her storatch bread just taken from a very hot oven. This means failed this the former and the poor victim gave birth to a laring and well formed child at term.—Woodman and Talv, I or Med., p. 754, from Tarcheu.

Class — Failure of valence to cause miscarriage.—A young woman seven months with child but employed sexum and other drugs to produce miscarriage. As these failed her paramour bound a strong leather strap tightly round her body. This, too, availing nothing, he fly his own confession) kinelt upon her with all his weight, and trampled on her while she lay on her back. As this also hinch, he body a sharp pointed pair of variety and proceeded to perform the asterna through the vagous. As the back when the confession is the straight of the confession o

## Justifiable Miscarriage.

In defining the offence of causing miscarriage, s 312 of the I P Code excepts as not criminal miscarriage caused "in good faith and for the purpose of saving the life of the woman". The law of England does not formally define under what circumstances it is lawful to cause miscarriage Usually justifiable miscarriage takes the form of "artificial induction of premature labour," is the operation is deferred until the child has attuned viability, so that, if possible its life as well as that of the mother may be sived. So long, however, as the operation is undertaken for the purpose of saving the life of the mother, miscarriage may be legally caused at any period of pregnancy. For the purpose of saving the mother's life it may be encessary to cause premature expulsion of the contents of the pregnant uterus in the following cases.—

(1) P. Ure distortion where the antero posterior diameter of the pelvis (normally 44 imches at the brim and 4; inches in the cautity is reduced below, or to, 31 inches (2) Obstruction by the presence of timours or contractions of the soft parts arising from ineatraces, of such a nature as to prevent the pressage of a mature child (3) Where during gestation the mother is his is endangered by obstinate, vonstings, harmorrhage from placents prewing, convolutions or serious cardiac or pulmonary or other disease. Dr. Meadows and others advise the artificial miduction of premature of the present of the contract of the present of the p

# Criminal Miscarriage.

Criminal abortion, or miscarriage, common in many countries, is especially common in India. It is resorted to by both single and married women in order to get rid of the product of illient intercourse or to avoid inconvenient additions to their families. In India the custom of preventing the remarriage of widows tends directly to increase the prevalence of the offence. In India, in fact, in by far the great majority of cross of this offence, the female who has miscarried in a Hindu widow (see Cases (a), (b), pp. 275-6) who resorts to this practice to avoid disgrace. This, however, is not invariably the case (see Case (d), p. 276). This crime is also not uncommonly practised by European women in India, as already noted.

Man of Undunfery, p 234

The sections of the Indian Penal Code concerning the offence of causing miscarriage are as follows —

- 312. 'Whoever voluntarily causes a woman with child to miscarry, shall if such miscarriage be not caused in good faith for the purpose of saving the lite of the woman, be purished with imprisonment of either description for a term which may extend to three years, or with fine, or with both, and if the woman be quick with child, shall be punished with imprisonment of either description for a term which may extend to seven years and shall also be liable to fine" "Tryplanation—A woman who causes herself to miscarry is within the meaning of this section.'
- 313. Whoever commits the offence defined in the last preceding section without the consent of the woman, whether the woman is quick with child or not, shall be punished with transportation for life or with imprisonment of either description which may extend to ten years, and shall also be liable to fine
- 314. 'Whoever with intent to cause the miscarriage of a woman with child does any act which causes the death of such woman, shall be punished with imprisonment of either description for a term which may extend to ten years, and shall also be liable to fine, and if the act is done without the consent of the woman, shall be punished either with transportation for life, or with the punishment above mentioned 'Explanation—It is not essential to this offence that the offender should know that the act is likely to cause death.' [Unlike in Lin\_tish Law the question here arises of the consent of the woman ] Two other sections of the Code refer to results which may arise to the child from the doing of certain acts before its birth, namely, a 315, and
- 316 Wheever does any act under such circumstances that if he thereby caused detth he would be guilty of culpable homicide, and does by such act cause the death of a quick unborn child shall be punished with imprisonment of either description for a term which may extend to ten years, and shall also be hable to fine

Attempts to take mecorrage may be dealt with either by the application of the provisions of \$511 of the Pent Code to \$312 or 1313, or if the attempt has been made by the administration of an "unwholesome drug or other thing the case may be dealt with under \$728. Hence by the law of India to voluntarily cause or attempt to cause 'miscarrage'

except in good faith for the purpose of saving the life of the woman is an offence, proof of pregnancy, which is required to convict for causing miscarriage is not required for an 'attempt

Further, supposing it to be proved that such an offince has been committed, the following additional questions are, owing to the wording of the above quoted sections, liable to arise -(1) Was the woman pregnant? Proof of pregnancy is required to secure a conviction for causing miscarriage but not to secure conviction for an attempt (2) Was the woman quick with child? (3) Was the miscarriage crused, or the attempt to cause it made without the consent of the woman? (4) Did the woman's death result from the miscarriage or the attempt to cause it? And (5) In certain cases (see ss 315 and 316) did the death of the child result from an act done before its birth ?

In England causing miscarriage is punishable by death or imprison ment under ss 58 t 59 of 24 t 25 Vict c 100 as amen led by 27 t 28

Vict c 47
S 58
Every woman being with child who with intent to procure her own miscarriage shall unlawfully administer to herself any poison or other noxious thing or shall unlawfully use any instrument or other means what soever with like intent an I whosoever with intent to procure the miscarriage of any woman whether she be or be not with chill shall

unlawfully administer etc shall be guilty of felony

Whosoever shall unlawfully supply or procure any poison or other noxious thing or any instrument or thing whatsoever, knowing that the same is inten led to be unlawfully used or employed with intent to procure the miscarriage of any woman whether she be or be not with child shall be guilty of misdemeanor and being convicted thereof shall be hable at the discretion of the court to be kept in penal servitude for the term of three years or to be imprisoned for any term not exceed ing two years -24 & 25 Vict c 100

N B -B; 27 & 28 Vict c 47 \* 2 the minimum term of penal servi

tude awardable is increased to five years. It may be noted that under these sections (1) the question of pregnancy only arises when a woman is accused of doing an act with intent to procure her own miscarriage (2) that the question of quickening does not arise at all and (3) that these sections do not like those of the Indian cole expressly provide that the absence of the woman a consent aggravates the offence Turther. in England if the death of the woman results the ordinary law of homi cide applies, the felony is considered to be murder

# Proofs of an Abortion.

In investigating a case of alleged criminal miscarriage examination should be made of —I The means alleged to have been used. II The substances alleged to have been expelled, and III The woman alleged to have miscarried

accused can only be convicted of an attempt to cause miscarriage

In England, except the accused be the female alleged to have mascarned the nature of the substances expelled from the uteros is immaterial

(b) They may contain an ovini, embryo, or immature fectus—As by the law of India causing miscarriage is punishable with greater severity if the woman be quick with child, it is important to determine the uterine age of an immature factus found in the matters expelled. For the characters of the factus at various periods of gestation, see p 294. In criminal miscarriage, it may be noted, the usual period selected is during the fifth or sixth month.

Cheers however, points out that women in India 'inct infragiently unders premature confinement when they have nearly advanced to their full period. 'I in gaing from examination of the fotus, an opinion as to whether quickening has occurred it must be borne in most that quickening does not take place at any fixed period. After ascertaining his probable dictrine age of the fortus the question of the cases and time of its death must next be considered. By the law of Lingland, the first that the death of the child resulted from crumial causing of mineralize, only affects the gravity of the office committed in one case, namely, where the child survives its complete botth. In such a case the officee committed is murder according to English law. This we not so in India In India, however, in certain cases, siese Penal Code, as 315 and 316) the fact that the death of the child resulted renders the offender hable to enhanced punsament.

(c) What has been expelled may be a mature child—In such a case it is of course possible that miscarriage has not occurred at all. When this is suspected, signs indicative of maturity should be carefully looked for One of the most important of these, only available however if the child be dead, is the presence in the lower epiphysis of the femur of a yound of ossification more than three quarters of a line in width. Of course, in all cases where the degree of maturity of the child indicates that it might possibly have been born able, the questions whether or not it survived its birth, and what wis the case of its death, must be inquired into, as in a case of alleved ufantisacle.

#### ADMINISTRATION OF DPLGS FOR MISCARPIAGE.

The substances popularly believed to possess abortificient properties, may conveniently be arranged in five classes, namely, (a) Echolics, (b) Reputed Emmenagogues, (c) Purgatives, (d) Irritants, and (c) Other substances The clandestine uso

<sup>1</sup> Med Jur. p 735

of such abortives by married women, both native and European, may be the cause of apparent menorrhagia, dysentery, paralysis, ete

(a) Echolics, se substances which stimulate the contraction of the muscular fibres of the uterus The only undoubtedly ecbolic drug known is ergot Administration of this, after the uterus has begun to contract, nearly always increases the force and frequency of its contractions When, however, contractions of the uterus have not commenced administration of ergot may or may not excite their commencement Apparently, the less advanced the pregnancy, the more likely is it to fail Hence, when given with criminal intent, as is frequently the case in England, it often fails to cause abortion Frgot has been stated to act injuriously on the child Dr U West,1 however, records that out of one hundred and seventy two labours in which he gave ergot, only five still births resulted or considerably less than the usual percentage of still to live births 2 Borax has been stated to possess ecobolic action, but this is extremely doubtful Cotton root bark is said to act on the uterus like ergot, and has been used as a substitute for it 3

(b) Reputed emmensgogues. te substances believed to promote the menstrual flow The principal substance of this class used criminally as an abortifacient, is Savin (Jumperus sobina) This is frequently employed in England, both in the form of powdered leaves (or a decoction made from them), and in the form of oil of savin. It often occasions abortion, but often fails When given in large doses for the purpose of procuring abortion it acts as a powerful irritant poison, and has in several cases caused death

The following reputed emmenagogue poisonous plants have also been criminally employed in Europe -Rue (Ruta graveolens), Yew (Taxus baccata), Tansy (Tanacetum vulgare), and, in India, Oleander (Nerium odorum and Cerbera theretia) All these are powerful poisons the first two have caused abortion, the others are not known to have any effect on the uterus Single cases of abortion, following internal administration of Actea racemosa (black snake root, or cohosh), and digitalis, the latter resulting fatally to the mother, have also been reported

Less active or non poisonous drugs of this class are -Pennyroval (Mentha pulcgium) This has been used in England for the purpose of procuring abortion Most authorities consider it to be without action on the uterus, and many do not even consider it to be a noxious substance 4 Tidy, however, doubts its absolute innocence 5

Papaya seeds (Carica papaya) and carrot seeds (Daucus carota), tern Gapr bil, are both popularly believed in India to be powerfully aborts In regard to the first Dymock states that the general belief among all classes of women in Southern and Western India, is that if a pregnant woman partakes of them even in moderate quantity, abortion will be the probable result. As regards the second numerous cases are recorded where carrot seeds have been given internally, their administration being followed by abortion. More precise information is much wanted as to the alleged abortifacient power of both these drugs

(c) Purgatives, especially such as cause much straining or act powerfully on the rectum, may, if given in large doses, bring on abortion

<sup>1</sup> Taylor, Med Jur , II , p 192 \* 51 per cent Lauder Brunton's Pharmacology, p 788

<sup>\*</sup> Taylor, Med Jur , II ,p 185 \* Mat Med of W India, p 295 \* Tidy, Leg Med , II , p 169

'This effect is more likely to result in the advanced than in the earlier

stages of preguancy.

In Indus, various Occurbatecous tibers, namely Occums trigones (Kart), Monordica (Marnatta (Karela), and Jennordica Cymbaliana (Karela), and Jennordica Cymbaliana (Karela), the second of the second

(d) Irotants.—Powerful irritants may, the purgatives, cause abortion owing to the uterus principating in the irritant action set up in the system. Obviously if given to an extent which renders abortion probable, the death of the mother is theleft to result. Mineral irritants which have been used, may be mentioned—(1) Arsenic, this is sometimes (imployed in India, it has, in more than one case, caused death without producing abortion (see Gate (d) p. 276). (2) Iron, the sulphate and the functive of the perchaption. have been used in England neither of the preparations appear to possess any specific abortifaction power. (3) Verency, this without such as England in the metallic form, and as colomel, without such as the most of the majoritant power of the production and plude formed one of the ingredients of a powder given with intent to cause abortion.

Organo Irritants Plumbago (roses and explanted) the puce of various Edphotonas, and the puce of the Calotropa process are all in more or less common use in India for internal administration as aborti facients. Chevrs also mentions as similarly used black pepper, unipo pineapple, the bark of Moringa ptersyopperma (horse radish tree), and blastering files. Copper and level salis have been used. Quinnes is very

commonly used in India as an abortifacient and sometimes produces the desired result.

Case—Aborton by quante "A Eurasan woman in Bombay took five directions of quante as an abortifaction: Three days later she give birth to a five month's fatus. She was for weeks in a very precarons condition as a result of quante povening. Collapse, feedble pulse great pallor, dysparka, muscular weakness, desiness almost complete for over and four months after she could not read. The return was remarkably pale and the calibre of the return was remarkably pale and the calibre of the return vessuls greatly reduced.—Prof. Powell's Reports, 1917.

(c) Other substances.—Numerous other substances, none of which so far as known possess any specific abortifacient power, are mentioned by various writers as enjoying more or less popular repute as echolics

In India, the puce of bamboo leaves, the fruit of Bandia diametorum (Vain phal or Gela phal), an enethe recommended as a substitute for precatanha in dysentery, a decoction of Cascula refleza (Akanuia, Ghaqur Ivl.), the seeds of Calastrus perioritas (Mallasyni), and the seeds of Anethum graveoleus or bown (Indian dill), have all been used See also, under "Possons," Dolchamforon felacta and Plumeraca acutyfolia

In Europe, squills, hellebore, and laburnum have all three been employed as abortiacents So also have the following sarsaparilla, guinea pepper (grains of paradise), saffron, guaiacum, horebound camomile, wormwood, mugwort, and jumper

## III -Examination of the Woman.

During life, traces left by the means employed may be found on the person of the female, eg bruises on the abdomen, marks of injury on the genitals, or foreign bodies in the vagina If miscurriage has actually been caused, the signs of recent delivery may be present. These obviously are less marked, the earlier the period of gestation at which the miscarriage has taken place, and the longer the interval which has elapsed since it occurred. In a case no signs of an alleged abortion at three months were present seven days after the event, on the other hand, the same compiler (Harvey) mentions a case where relaxation of the genitals was found six or seven days after abortion at two to two and a quarter months, and another, where in a woman at twenty two, eight days after abortion at four months, the following signs were found vagina slightly dilated puerperal smell distinct, the uterus could be felt through the abdominal wall, and a little milk could be squeezed from the breasts In other cases signs sufficient to indicate abortion were reported to be present a fortnight to a month after the occurrence 1

After death.—Further traces left by the means employed may be found eg extravasation of blood underlying bruses, internal wounds, signs of irritation on the mucous membrane of the alimentary enal, presence of poisons, etc. In addition to the signs of recent delivery present during life, others become available, derived from examination of (1) the uterus, and (2) the ovaries.

1 The uterus.—This may be found enlarged, the enlargement being greater, the more advanced the period of gestation at which delivery took place, and the less the time which has elapsed since the event. Montgomery gives its dimensions a day or two after delivery at the full term, as 7 to 8 inches by 4 inches, and its weight as 1½ lbs. Fourteen days after delivery at the full term, it does not exceed 5 inches in length, and weighs about ½ lb. If delivery has taken place at five months, the uterus, according to the same authority, will be found

Bengal Med Leg Rep 1870-72 p 297

immediately afterwards to measure 5, by 3, mohes, and four teen days afterwards 4½ by 25 inches On internal evanina tion within a few hours of delivery at the full term couguls or fluid tinged with blood will be found in the cavity. At the seat of attachment of the placents the substance of the or, an will be found exposed showing large valvular openings. The inner surface is extremely dark almost black in colour and portions of the deerdua, intermived with flakes of lymph adhere to it. These appearances also are less marked the earlier the period of cestation and the longer the time which has clapsed since expulsion of the uterine contents. As already point I out trugs of irritant plants or pieces of stick may in shortion cases be found in the cavity of the uterus or transforing its walls.

2 The ovaries —Ordinarily at each menstruation an ovum ease from the ovary leaving behind it a cicatrix called a corpus litterim. As a rule this cicatrix undergoes a peculiar development during pregnancy but does not undergo such development if the escape of the ovum is not followed by pregnancy. Hence corpora lutea are distinguished as true and false meaning by a five corpus luteum the corpus luteum of pregnancy and by a false corpus luteum the corpus luteum of the unimpregnated femrle. In some exceptional cases it edvelopment of the cicatrix and its conversion into a body not distinguishable from a true corpus luteum has been found to occur in the unimpregnated female and price ex-d in other exceptional cases no such developed cicatrix has been found in a pregnant female.

On this important matter Professor I lowell has put the subject very clearly and concessly. He says. At each mensurual period an ovum escapes from the ovary Laving the Gradian follicle distended with blood. If pregnancy does not follow this I lood becomes absorbed so that at the end of two months there is in most cases only a trilling sear to indicate its position. Should pregnancy however ensue in most cases the wall of the follicle becomes thickened convoluted and of a yellow colour the central clot becomes fibrinized and decolorized. At the ninth month the whole sear is usually about half an inch in diameter and has received the name corpus lateum."

These changes are by no means constant in pregnancy and

may take place in a virgin s ovary

As they can only be found post mortem when more definite evidence of pregnancy can be obtained in the uterus breasts etc their value as evidence is slight and unreliable

#### Post mortem delivery.

In examining the dead body of a female alleged to have miscarried, the possibility of the occurrence of this accident must not be forgotten Post mortem delivery, owing to the pressure of gases evolved during putrefaction, may occur after death at any period of gestation I it may or may not be accompanied by inversion of the uterus. Inversion even of the non-gravid uterus may occur from the same cause I in the Bengal Medico-legal Reports for the three years ending 1872, nine or ten cases of post mortem delivery are cited, and several of post mortem inversion of the non-gravid uterus were reported during this period. For a typical case of post mortem delivery, see the following.—

Case —Post mortem delivery.—A Mussulman, aged about twenty—seen, stabout the full term of pregrousey, committed suicale by drowning. Three days after she was missed, her body was found in a well much decomposed, but presenting no signs of delivery. It was left at the state of the ground in the sou (in June), a woman, a statistic at the state of the state

## CHAPTER XVI

#### INFANTICIDE.

'INFARICIDE' is a term popularly used to denote the murder or homicide of a newly born infant. The law, however, draws no such distinction, infanticide is homicide in law, and the provisions of the law which apply to homicide apply equally to infanticide. But although the law draws no distinction between infanticide and homicide, the subject of infanticide requires special consideration on account of (1) the frequency of the crime, and (2) the special questions which arise

## (1) Cause and Frequency.

Infanticide is common malmost all countries, the motive being generally to get rid of an illegitimate child, or less commonly, to get rid of a child the parents are too poor to support. In India two forms of infanticide may be said to exist, namely, (1) infanticide irrespective of the sex of the child, and (2) infanticide of female children.

As regards the first of these forms of infantionic, the motives leading to it in India are similar to those which lead to it in other countries. His frequency in India is, however, specially affected by certain social customs, viz (a) eight margings, which tends to diminish the frequency of the crime, and (6) probablism, especially among higher caste lindus, of widow remarings, while the legit to increase its frequency. As a consequency, therefore, while in Luropian countries the secured is most a lindual value manifred female, in India the accusal is very frequently and India value.

The second form of infanticule may be said to be special to the LatIn India the motives leading to it, are (a) family pride among certain
drivings of the warrior caste (habstin), notably the Barger's and Taller's
and consequently as the second control of the second control of the second control of the second control of the second control of the second control of the second control of the second control of the second control of the second control of the second control of the second control of the second control of the second control of the second control of the British Government, this second form of infanticule had been
retudered much less prevalent, it was considered necessary in 1870 to pass

a special Act for its repression 1 and even now the crime is far from rate Some idea of the extent to which it was practised may be found from the facts which came out in the course of an inquiry ordered by Govern ment previous to the passing of the Act. It was found for example that in many villages of the Benares district there were no gurls at all. In Mainpura again out of thirty villages in eleven there were no gurls and in the whole thirty only 87 gurls to 329 boys. Again in the United Trowness in seven villages in labited by Raiputs there were 104 boys to one gril and in nine other villages 71 boys to see in girls 1 In Athhamar and Authch also the practice largely prevailed in the latter province in 1840 there. were only 335 funders to 4912 males of pure Jadels (Raiput) blood 3 Turther it was shown that where measures for the repression of the crime had been adopted the result was to greatly increase the number of female chil Iren. In Mainpuri for example the number of Paiput girls rose in thirteen years from nil to 2,0 and in the Agradistrict the number of girls was doubled in a few years.

# (2) Questions in Infanticide.

It has already been stated that the legal term 'homicide' means the destroying of a human being According to the criminal live of Figland an infant is not considered a human being until the moment it is completely born is completely and wholly external to the mother irrespective of whether or no it be still attached to the mother by the umbilical cord llence, according to English law, the destruction of an infant before its complete britth has taken place is not homicide.

According to the law of India, however so far as homicide is concerned a child is in being from the moment 'any part of that child has been brought forth though the child may not have breathed or been completely born ' Hence, according to Indian law, killing an infunt before any part of it. is born. is not homicide. Further, if the result of an act is to raise a child to die after its complete birth the doing of the act is not punishable as cultipath formicid. Section 315 of the Indian Penal Code states ' Wioever before the litth of any child does any act with the intention of thereby preventing that child from being born allve, or causing it to die after its birth

Act YIII of 1870. The chief provisions of this Act are as follows — Power is given to the Local Governments to apply the Act to any district or class and thereafter (subject to confirmation by the Government of India) to make rules applicable to such district or class. (1) for the registration of births marriages and deaths. (2) for the regulation and limitation of marriago expenses. and (3) for the establishment of punitive police posts.

<sup>&</sup>lt;sup>2</sup> Chevers Med Jur p 755

These figures in 1878 had risen to 4272 females to 8371 males (Cooke on December 1975)

the Repression of Femals Infanticide in Bombay 1875)

The causing of the death of a child in the mother swomb is not homicide
But it may amount to equipable homicide to cause the death of a living child
if any part of that child has been brought forth though the child may not
have breathed or been considered by Don — I. P. Code., 290 erul. 3

and does by such act prevent that child from being born alive or causes it to die after its birth, shall, if such act be not caused in good faith for the purpose of saving the life of the mother, be punished with imprisonment of other description for a term which may extend to ten years or with fine, or with both." This is not so in Fingland By English law, the doing, before the birth of a child of a febonious act, the result of which is to cause the child to die after its complete birth, is mirder

# Investigation.

Hence the chief medico legal questions which arise in cases of alleged infanticide are (1) Did this child live after its birth? This question for the purposes of English criminal law, must be read as if the latter part of it stood after its complete birth, while for the purposes of Indian criminal law it must be read as if the latter part of it stood 'after any part of it was born' (2) What was the cause of the child s death? and (3) Does this woman cylinbit signs of having been delivered (or recently delivered) of a child? These imply examination of the child and of the mother

## Examination of the Child.

LIVE BIFTH-DID THIS CHILD LIVE AFTER ITS BILTH?

In cases of alleged infanticide it has always been the precitee of the English courts to require in order to establish the fact of live birth much stronger evidence than they will accept as proof of the same fact in civil cases. Moreover, in an infanticide case it is possible that the fact that the end little divide after its birth may be capable of being established by the evidence of ordinary winnesses. e.g. of individuals who saw the child more or heard it cry. In regard to crying as a proof of live birth—and it appears that the word 'still born means 'silent born'—int must be noted that it is possible that a child may be heard to cry before tirth and while its head is still in the uterus (regatus uternus) or in the vagini (regatus vaginals). Several authentic cases of vagitus uternus (Dr. Ogston has collected nine') have been recorded (see the following case), and several others of vagitus vaginals).

In all the authentic cases of vagites utermus or vagita, vaginals which have been reported a pissage by which air could reach it emouth of the chill was provid d, it his introduction of the hand or instruments into the uterus or vagina. Although therefore it must be admitted that a child may be heard to or yelfore any part of it has been born, there is

Notes and Queries, April 4 1904. \* Lect Mel Jur, pp 247 et et ;

to doubt but that such cases are extremely rare, and have only been known oo occur under the special circumstances stated above Obviou ly, also child may be heard to cry after the birth of the head and before complete birth; the question however whither or no the crying took place after attral but before complete birth would not be instead in a case of leged infanticide in in la although it might be so in an Linglish age.

Case - Vagitus uterinus - In 1834 Dr Joubert was called to assist n the delivery of a woman with a deformed pelvis who had had two bortions previously After strong pains the membranes had ruptured orty eight hours before his visit. On examining the woman he found he head of the chill above the brun of the pelvis the occuput an I face owards the right and left iliac fossy. The parietal bones had alone ntered the brim of the pelvis. The os uteri was dilated to about 2 inches As the narrowness of the antero posterior diameter of the pelvis proved an obstacle to the lescent of the head the forceps was applied to it when, at the moment the operator commence I his attempts at extraction the tetus during some secon la uttered repette lan l'distinct cries which were heard by all in the room After this while consilering whether it would be advisal le to I ring down the feet from the little effect produced by the forceps the cries were renewed as listinctly as before as from the effect of repeated inspirations Finally when introducing his hand in order to lay hold of the feet the moment it passed over the left shouller, the factus for the third time attered cries less prolonged than before yet afficiently loud to be heard by all present —Ogston Well Jur Lect p 247

As a rule, however, in cross of alleged infantiated the only evidence of live birth available is the opinion of an expert founded on post mortem examination of the body of the infant In giving such an opinion the following points must be considered —(1) What is the degree of maturity of the child? (2) Does it show signs of having breathed? (3) Does it show any signs of live birth other than such as are directly due to the establishment of respiration? (4) Does it show signs of having been born dead?

#### THE DEGREE OF MATURITY OF THE CHILD

In order to establish the fact that infanticide has been committed the law (both of England and of India) requires it to be proved that the child was born alive, not that it was born 'viable' or capable of living and being reared. The degree of maturity of the child, however is a factor which must be taken into account in framing an answer to the question Did thus child live after its birth? because the less the degree of maturity, the less the probability of live birth. Indeed in the case of a child born before the 120th day of intra uterine life the possibility of live birth may be altogether excluded. (For the characters whereby the degree of maturity can be ascertaimed, see p. 294).

Does the child show signs of having breathed?--When respiration has been fully established certain changes will be found to have taken place in the lungs, viz (1) they alter in appearance and feel, (2) they increase in weight, and (3) their specific gravity is lowered



Fig 26 -Infantile Lungs before breathing 1

# (1) Altered appearance, etc., of lungs -

Before Respiration

Uniform dark liver colour

Solid occupy only the upper dorsal part of the chest leaving pers cardium exposed

Not crepitant when bandled or cut and exude little blood on section. No inflated air vesicles visible but possibly lubbles of gas due to putrefaction present on surface of the lung. These are .—

(1) Large and not uniform (2) Not in groups

(3) Project considerably from the surface of the lung and (4) The gas in them can be pushed readily from place

to place (5) Bubbles collapse on pricking

After Respiration.

Mottled red or pink and grey with blood vessels over surface Expanded and reach the sides of

the pericardium Crepitate when handled or cut, and exude frothy blood on section. Inflated sir vesicles visible on sur

face of lung. These are -

l) Small nearly uniform

In Groups Project only slightly or not

at all and (4) Cannot be pushed from place to place

(2) Increase in weight of lungs, owing to the increased amount of blood they contum—Hence a test for establishment of respiration has been proposed from the absolute weight of the lungs (Schmidt's test)

As regards this test Guy (from over 400 cases) gives the following as the average weight of the lungs in meture children. Before respiration, 874 grains, after respiration, 1072 grains. Individual cases, however, depart is og greatly from these averages as to make this test most untrustworthy. Thus, in mine of Guy's cases, the weight of the lungs of children that had breathed was below 874 grains (the average in still born children), and in four of the nine below 600 grains. Again, Ogston gives a case where after respiration the lungs weighted only 420 grains. Purther, in three of Guy's cases, the weights of the lungs of stillborn children were as follows 1054 1480, and 1950 grains and in two of Ogston's cases, 1180 and 1815 grains.

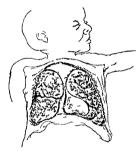


Fig 27 -Infantile Lungs after breathing for several days 1

N B —Such expansion is only got when child has lived for several days, and soldom then

(3) Lungs specific gravity is lowered.—In the fœtal condition and before distension with air, the lungs are heavier than water. After distension with air they become lighter than water. Hence if a portion of an undistended lung be thrown into water it sinks, while a portion of a distended lung floats. On this is founded.

<sup>1</sup> Guy and Ferrier

<sup>\*</sup> Taylor found the sp gr of undistended lungs to be 104, 105, and the sp gr of the lungs of an infant that had breathed to be 004

# The Hydrostatic Test.

Procedure - The tests should be conducted as follows The water employed should be of a specific gravity as new 1000 as possible eg inin-water or nearly pure water at 60° Fahrenheit.1 With this a glass vessel large enough to allow of the lungs floating should be nearly filled. The lungs with the heart attached having been removed from the body are to be placed in the vessel and it is to be noted whether they float or sink, Next each lung detached from the heart is to be separately and similarly tried, then each lung is to be cut into about twelve pieces and each piece also tried Lastly, it is to be noted whether the pieces if they float continue to float after firm but moderate pressure has been applied to them The pressure should be applied by firmly squeezing each piece separately under water between the finger and thumb If the gas present be only that due to decomposition it will escape as large bubbles and the piece will subsequently sink. If the air pre ent be due to resturation only part of this can be expelled and will rise to the surface as a stream of minute-dots. The pieces of lung will continue to float unless in advanced decomposition or if undue violence be used in squeezing

Objections —It has been objected to the presumption upon which this hydrostatic test is founded that —

1 Undateded portions of lung may float in water orang to the presence in the intercellular taxes of air complishmen or gases generated by putrefaction. This undoubtedly may occur. But air or gases present in the intercellular its, see of a portion of a lung may be expelled their from 1 y moderate pressure. On the other hand moderate pressure or a fair sized puece of a distended lung fails to expel any notable quantity of the air contained in its air vesicles. Hence if such a piece of a ling continues to float after moderate pressure has been applied to it we finally safet that the floatation is due to distension of its air vesicles and not to emphysema or putrefaction. When however the lungs are in a a latunced state of putrefaction moderate pressure will not true the whole of the putrefactive, gases present in the intercellular tissue, and may even break up the lung issues and cause expulsion of air from its air vesicles. Hence it is advantable to refraint from dissuring the second of the present continues the continue of the properties of the present continues and the present continues and the present continues and the present continues and the present continues and the present continues and the present continues and the present continues and the present of the properties of the body is far advanced their condition is not fixely to be such as to make it unsure to draw decaded inferences from the results of the hydrostatu test.

Rise of temperature lowers the sp gr of water dissolved solid matters are all if the water is nearly pure, and its temperature a shoot EO Pahr about three ounces of common said dissolved in five gallons of the water will restore its sp gr to about 1000. To water at 507 labr the quantity required is about five ounces of sait to five gallons of water 2 Portions of the Distended Lungs may sink in water owing to disease, e.g. congenital timours, ordema, congestion, hepatiration, etc. This is also true. Hence, therefore if post morten examination shows the existence of very extensive disease of the lungs, we ought logically to refram from drawing the inference that no portion of either lung has been distended with air, because all portions such in water. Fractically, however, as (I) cases of such very extensive disease of the lungs are extremely rare in newly born infants and (2) no harm results in criminal cases if the inference drawn is that the lungs have not been discleded, the objection that portions of the distended lungs may sink owing to disease may be disregarded.

Inferences.—Given, then, that the following conditions are complied with —(a) that the lungs are not in an advanced state of putiefaction, (b) that she lung is ent into, say, twelve tolerably equal sized pieces, and (c) that firm but moderate pressure has been applied to each piece, we may safely conclude that each piece that sinks has not been distended with air. And that each piece that floats has been distended with air.

# Hydrostatic Test as Evidence of Respiration.

Conducting the test as directed, and finding that each piece of lung sinks, we come to the conclusion that no portion of |1 either lung has been distended with air, we may practically conclude that respiration has not taken place because (1) Infants are not known to live for several hours after birth without any portion of their lungs having become distended with air, and (2) in criminal cases, no harm results from drawing the inference that respiration has not taken place. If, however, we find that some or all portions of the lungs have been distended with air, what inference may we then draw as regards respiration? Here it must be pointed out that distension with air may be due either to (a) artificial inflation. or (b) natural respiration, and that it is only when the first of these two causes of distension has been excluded, that we may with safety draw the conclusion, that the distension observed is the result of natural respiration

Attificial inflation is however, contra indicated (a) if every portion of either lung is distented, because it is extremely difficult even by skilled manipulation to effects complete distension of both lungs in situ so difficult, in fact, that Ogston and others entirely deny the possibility of effecting it. (b) if the lungs on section exude much frothy blood, and (c) if the stomach and intestines are free from air, for it is impossible to inflate the lungs from the mouth without a large proportion of air getting into the stomach. The circumstances of the case also may be, and in mfanticide cises generally are, such as to exclude artificial inflation, or at any rate skilled artificial inflation.

Hence, then, if attending to the precautions specified, we come to the conclusion (every piece floating), that every portion of the lungs has been distended with air, we practically, in cases of infanticide, may safely infer that respiration has taken

place If however, we come to the conclusion (some preceflorting and others ainking) that portions of the langs only have been distended with air, the inference is, that either artificial inflation has been effected, or natural respiration has taken place. The question to which of these causes the distension is due, cannot be decided by the hydrostatic test alone, and in many cases also cannot be decided without taking into account the circumstances of the case. The existence in the otherwise distended lungs of portions in an undistended condition has been noticed in children in whom natural respiration has been established and has been described under the name of attectasts pulmonum.

Other evidences of respiration.—If the changes in the lungs indicate that respiration has taken place, no confirmator, evidence is needed, but such may be afforded by the condition of the anterior chest wall and condition of the disphragm. After respiration has been established, the former becomes more arched and the upper surface of the latter becomes less convex and lies lower Tinding the upper surface of the disphragm at a level corresponding to between the fifth and sixth ribs, may be regarded as confirmatory evidence of the establishment of respiration.<sup>1</sup>

## Respiration as Evidence of Live Birth

It must be pointed out that the two questions, Did this child breathe? and did this child live after its burth? are not strictly concurrent and that a negative or affirmative answer to the first, does not necessarily involve a similar answer to the second hexans—

- (c) A child may live after its birth without respiring or may respire on imperfectly that it may be imposail le by post riortem examination to obtain satisfactory proof that respiration has taken place
- (6) A child may respire before any part of it has been born—That thus a possible is shown by the fact that cases of vagitus uterims and vagitus againsts have been recorded. Respiration before birth is, how ever (1) only likely to occur in a case of face presentation or under conditions similar to those present in the recorded cases of vagitus uterims or vaginals (2) extremely rare and (3) not likely to be anything more than imperfect and not likely to be anything more than imperfect and not likely therefore, to cause full distinction of every part of the lungs

These two cases excepted, it is obvious that in a criminal case in India proof that respiration has taken place do facto, amounts to proof of live birth, and ever versu

In crimin it cases in England a third possil thity must be excepted, viz.

(c) A child may respire after partial and I efore complete birth.—The

<sup>1</sup> The position of the diaphragm should be ascertained from below before the thorax is opened possibility of the occurrence of this is beyond doubt. Whether, however, this has or has not occurred, cannot possibly be decided by post mortem examination.

Does this child show signs of live birth, other than those directly due to the establishment of respiration?

The most important signs of live birth coming under this description are—

- $\kappa^{r}(a)$  Presence of food, eg milk or of drugs in the stomach—This affords conclusive evidence of live birth
- r(b) Complete absence of meconium from the intestines —In exceptional cases, the meconium is completely expelled before birth but, as a rule, it's complete expulsion is not effected until some hours after birth. Hence complete absence of the meconium from the intestines affords strong but not conclusive evulence of live birth.
- (c) Exfolation of the scarf shit —This generally commences about the first day after birth, but sometimes not till later, and may not complete for a month or more it is difficult, however, sometimes to distinguish this vital change from peeling of the cuticle resulting from intra uterine maceration
- (d) Changes in and about the umbilical cord—These are (1) Obli-teration of its vessels (the attrines first), commencing about twenty four hours after birth and, according to Billard, taking place by concentre thickening (2) formation (generally about the third day) of a ring of inflammatory reduces, round the insertion of, the cord, accompanied by thickening, and often by a slight purplied discharge. This ring of inflammatory reduces must not be confounded with a narrower red line round the insertion of the cord, often present at birth (3) Falling of of the cord, occurring about the fifth day (in exceptional cases, as actly generally complete about the tenth to the twelfth day. Shrinking and withering of the cord commences soon after birth, but not being a vital change, is not a sign of live birth.
- √(e) Closure of the special channels of fœtal circulation —(1) The internal portions of the umbilical arteries (hypogastric arteries), the internal portions of the umbilical vein, and its continuation, the ductus venosus. The concentric thickening of these commencing at the umbili cus (see above) continues, at the end of two days the arteries are contracted for the greater portion of their length, and by the end of the third day the contraction has nearly reached their termination in the thats The vein and ductus venosus contract more slowly, showing only slight contraction for the first three days, which becomes more marked on the fourth day, and 18, with few exceptions complete on the fifth (Guy) (2) The ductus arteriosus —This begins to contract (at the acrtic end first) as soon as respiration is established. The contraction extends throughout the whole length usually during the first day the second day, the channel becomes narrowed to the size of a crow quill, and the lumea is usually closed about the tenth day (3) The foramen ovale usually closes between the second and the tenth day In exceptional cases, closure before birth has been recorded in the case of the foramen ovale, and within, at any rate, ten minutes of birth, in the case of the ductus arteriosus. No case of closure before birth of the ductus venosus is on record The foramen ovale sometimes does not close till the end of

the second year Sometimes the foramen ovale, or the ductus arteriosus remains patent throughout life

Uf) Other signs of his bith which have been alvanced are —(1) Emptoness of the minary bloader, this is wholly unrel the and (2) prescree of air in the early before brith is filled. This indicates that respiration Las taken place. As however, the replacement may not reportation Las taken place. As however, the replacement may not be a first worked and the country of the tymps own in the control of the relation of the country of the tymps own is wholly purchable as a sign of still bath, or of death soon offer.

Certain of the foregoing signs of live birth may be utilized for the purpose of determining how long a child has survived its birth (see following tables)

PROPORTION OF CASES IN WHICH THE FORAMEN OVALE AND DUCTUS ARTE HOSCS HAVE BEEN FOUND OPEN AT VARIOUS PERIODS AFTER BIETH

The third column shows (calculated from Tardieu as quoted by Tidy) the proportion of cases in which separation of the cord was found to have taken place (Gur)

Day	Foramen ovale open in cases, per cept.	Ductos arteriorus open in cases, per cent.	Cords separate to cues, per cent.
1		68	
2	68	59	8
3	68 64	68	17
4	63	63	40
5	45	52	70
6	1 -	~-	90
7	1 —		95
8	45 — — ~ 5	15	97

Charges which occur during the Fibst few Days after Birth (Tidy modified)

Per od after birth	Conditions observed.	
A few minutes to some hours	The stomach contains a frothy fluid and clots will be found in the vessels of the umbilical cord	
After 21 hours	Concentric thickening of the umbilical arteries near umbilicus	
After 2nd day	Contraction throughout the greater part of the um b lical arteries Epidermis beginning to exfoliate	
After 3rd day	Umbilical arteries contracted throughout Slight contraction of the umbilical veins. Formation of inflamed ring round cord	
After 4th day	Cord separated.	
After 5th day	Contraction of umbilical veins complete	
6th to 10th day	I cetal circulatory openings obliterated.	

Does this child show signs of having been born dead? The body may show signs of intri-uterine maceration

This is readily distinguished from ordinary nutrefaction. In intra uterine miscretion (1) the olour childed by the body differs matchly from the odour of ordinary putrefaction. (2) The skin is copper, red, or feat coloured, not green (8) The bones are more or less separated, and the body is flaced, the head thorax and abdomen flattening out when the body is placed on a level surface. It must be recollected, however, the that when death has occurred shortly before delivery, signs indicating intra uterine maceration will be absent, and (6) that after delivery, ordinary putrefaction may superview and mask the appearances resulting from intra uterine maceration. Hence, therefore, while the presence of distinct signs of intra uterine maceration amonats to positive proof of still brith, no inference can be drawn from the absence of such signs

#### What was the Cause of the Child's Death?

Was the child's death due to (a) natural causes, (b) violence, or (c) neglect or omission

# √(a) Death of Infant from Natural Causes.

Children are frequently born dead from natural causes, Still-birth is more frequent (a) in first than in subsequent pregnancies, (b) in male than in female children, and (c) among illegitimate than among legitimate children.

Statutes show the proportion of still to live births to be about 54 per cent of the total number of births, and to be (a) about 0 per cent. in irst as compared with about 52 per cent in other pregnancies, (b) about 58 per cent in male as compared with about 47 per cent in female children, (c) about two es agreat among illegitimate as among legitimate children.

Death from natural causes may be due to.

1 Immaturity and consequent debility.—When a child is born alive, and dies after its birth, solely in consequence of debility arising from its want of maturity, the question arises, Was the premature delivery, as a result of which the child was born immature, criminally induced or not? If criminally induced, an offence has obviously been committed By the law of India, however, this offence is not punishable as culpible homicide.

On the other hand according to the law of England, provided, of course, the child lived after its complete birth, the offence which has been committed is murder <sup>2</sup>

2 Debility not due to immaturity.—A mature infant free from disease, may die from debility, and consequent inability

1 See Penal Code, s 315 2 See case of R v West, Taylor, Med Jur, II, p 8184 4FEDI to continue breathing. In such a case the lungs will most probably be found, at any rate in parts, imperfectly distended and portions may be found in a condition of atelectasis (see p. 3.56).

- 3 Disease.—This may be general disease, e.g. small pox, syphilis, or cancer or local disease. If the latter, the seat of the disease may be the lungs, brain, or heart
- 1 Congenital disease of lungs—This, according to Guy, may be (a) hepatization—red or grey—from pneumonia before birth, or "white" or syphilitic, which is common, (b) pulmonary apoplexy, (c) tuberelt, (d) adema, or (c) Devergie a adema lardaciforme
- 2 Disease of brain and cord may be (a) morbil softening "but it must be borne in mid that the brain of the fetus is naturally soft and vascular", 1 (b) effusion of blood (apoplexy) into the substance, cavities, or on to the surface of the brain or (d) effusion of other fluids of g serum or ms
- 3 Disease of the heart or large vessels is rare in infancy Tidy also mentions are sei l infarction, te blocking of the kidney tubes with unc

acid or urates as a cause of infant mortality

Obviously post mortem evidence of the existence of disease does not
necessarily prove death therefrom, much must depend on the extent of
the diseased condition

- 4 Malformation.—Death may be due to a congenital malformation, eg of heart or large vessels, or of the alumentray caural, such as an imperferate gullet or anus, or of diaplinagin causing hernix (Powell reports three such cases) No amount of malformation or monstrosity justifies the destruction of the infant
- 5 Haemorrhage from apertures of the body may cause death, eg from the gentals of a female infant, or from the rectum

  Two such cases are recorded by Casner
- 6 Protracted or complex labour frequently results in the death of the infant the immediate cause of death may be—
  - 1 Accidental violence to the body of the child (see p 841)
- 2 Exhauston from protracted labour—Death from this cause is frequently accompanied by marks of voicines on the body of the child, especially on the fixed, but may not be so accompanied Protracted labour is more common m first than in subsequent elievience, and the greater the disproportion between the size of the child and that of the mother's relieva the more hiely is labour to be protracted "Aide children are generally larger than fundle children hence more male than femalo children due during delivery.
- 8 Foetal asphyxia.—Asphyxia may occur before birth, owing to premature separation of the Thicenta, or be due to (a) the death of the mother, or (b) obstruction to the flow of blood through the cord With reference to (a), Tidy remarks that there is more chance of saving the

child when the mother has deed suddenly, then when her death has occurred slowly. Garczky concludes that in most cases infants are more or less asphyxated after the first munte but that they may be extracted alive in a more or less asphyxated condition up to twenty air muntes after the death of the mother. Harris considers that a child may live still longer (one to two hours). From Tudy a summary of 379 cases of post mortem Casaccan section it appears that in 813 per cent of the cases the children were dead when extracted and in 9 per cent distinctly alive but of these only one seventh lived for any length of time. As regards (b) the "betruction to the flow of blood may bedue to pressure on the cord from abnormal presentation eg foot or breech or from prolapse of the cord. Scanzon gives nearly 55 per cent as the mortality in cases of prolapse of the cord. Agunt the obstruction may be due to the even have been found and lastly the obstruction may arise from spontaneous replace of the cord distribution of a tightly drawn knot on the cord two knots even have been found and lastly the obstruction may arise from spontaneous replace of the cord distribution delivery.

#### (b) Death from Violence

Death from violence may be the result of accident, or the violence may have been inflicted intentionally, if the latter, under Indian law, it will be a maternal question whether or no death resulted from an act done before the birth of the child Again death from violence may be due to mechanical violence, or to poison, in the former case the mode of death may be asphyxia, from suffection drowning or strungulation, or coma, from head injury, or syncope

- 1 Asphyxia from suffocation.—Accidental suffocation may occur in many ways, eg from the head being born enveloped in the membranes, from pressure of the clilds face against soft bedding, from the child being overland by some one in the same bed, or from accidental entry of particles of food into the ur passages Intentional suffocation is a frequent mode of infanticide The following are the more commonly adopted methods —
- (1) Drawing the membranes tightly over the chill a head (2) closure of the mouth and nostrils by the hand or a cloth (3) stuffing mull or rags into the mouth or plugging the fauces with a piece of cotton wool some times in India smeared with mustard oil, (4) rolling the tongue back multi-the tongue of the matters (5) burying the child a face in brain or in made cow lung or other matters. Any matters found in the throat of the infant should be carefully examined and preserved.
- 2 Asphyxia from drowning.—Accidental drowning (or suffocation) may occur from the infant falling into a pray or cesspool, owing to the mother being suddenly delivered while in the act of deflecation this may occur even in primprire linding the cord torn across, in occur is supports the supposition.

<sup>1</sup> Usually about two mches from the navel (Guy)

- of the occurrence of such an accident Accidental drowning may also occur from the infant at the time of delivery falling face downwards into the mother's discharges Intentional drowning is sometimes resorted to. In some parts of India, immersion of the child's face in milk is a common method of infanticide
- 3 Asphyxia from strangulation.—Accidental strangulation may occur from the lunis becoming tightly coiled round the neck of the child Intentional strangulation, by the fingers funis or other ligature, is a frequent form of infanticida. As before mentioned (see 'Hanging and Strangulation), if the ligature employed is a soft one, eg the funis, no marks may be left on the neck Casper points out that natural folds on the skin of the neck, especially of fat infants, some what resemble marks caused by a ligature. Close examination and dissection of such marks, however will show no extravisation and no condensation of trisse If the post mortem appearances show that death has been due to asphyxia, much will depend on the absence or presence of marks indicating that the asphyxia has been due to violence. If all such marks are absent death may have been the result either of accident or intention, it is not possible from the post mortem examination to say which If such marks are present, much will depend on what they are Some, of themselves, strongly indicate intention eg finger marks on the throat, or rags, etc, firmly impracted in the fraces. Others are consistent with either accident or intention the probabilities being more in favour of intention than accident if the amount of violence has been great. A torn cord supports the supposition of accident
- 4. Coma Death from coma, due to head injury, may occur before labour, during labour, or after delivery. Here it is highly important to note that the 'Caput succedaneum' is generally a bruse and after death presents in most cause the appearances of a bruse. On this point Professor Powell notes, "I um afraid that many a false charge of infanticide his been brought through practitioners not recognizing this fact, chiefly owing to the false teaching of text-books that the Caput is a serous effusion."
- 1 Before labour —In very exceptional cases fracture of the skull of the factors in utero has been caused by violence applied to the body of the mother Thus, Ogston (p. 265) mentions a case where a fracture of the right partical bone, one inch in length, resulted from the mother, during a fit of hysteria falling out of bed four weeks before delivery (see also

Case below) Great violence may, however, be applied to the body of the mother without injury to the fætus.

- 2 During labour -Pressure on the head from expulsive efforts during delivery may cause death from coma either without or with frac ture of the skull The first and much the most common case (without fracture), is the most frequent cause of death during delivery. In such cases, inside the cranium will be found congestion of the brain and its membranes and in rare cases extravasation of blood. Outside the cranium a serosanguinolent tumour (caput succedaneum or cephalhæmatoma) fre quently forms Extravasations of blood under the scalp, due to pressure on the head are, it should be noted larger in size and more irregular in outline than the punctiform ecchymoses which occur under the scalp in cases of suffocation (see ante, p 229) Injury to the head may be the result of efforts to effect delivery - If the result of the mother sown efforts the skull is not likely to be more than slightly fractured. Extensive injury may obviously be produced by the use of instruments and considerable injury may be produced without the use of instruments, by ignorant efforts to aid delivery (see following Case)
  - Case —Fracture of an infant's skull from attempts to aid delivery Dr Hucks was called by a midwic to aid the delivery of a woman On examination he observed that the skull was fractured through the particulatione one side, and there was a slight fracture of the elge of the occupital bone, with a scalp tumour The head of the child was at the brim of the pelvis and the fractures had been produced by the midwise in her attempts to push the head back into the cavity —Taylor Med Jur II p 404
  - 8 After delivery—If a woman is delivered in an erect position and the child fails on a hard floor, fatal injurt to the head with or without fracture to the skull may occur. The possibility of this is aboven (a) by the fact that several cases of this acculent have been recorded (see Taylor, II 890), and (b) by Casper a experiments on the bodies of infants, which conclusively prove that a fall from a height of '90 inches suffices to cause fracture of the skull. In every one of Casper s experiments twenty four in number fracture was actually produced, confined however, to the temporal bones in twenty two out of the twenty four cases. As before noted sudden delivery, leading possibly to such an accident, may occur even in primapara (see following Gase)
  - Case Sudden delivery in a primipara -M C at twenty three, single was suddenly delivered of a full grown male child at 5 80 a m She stated that between 4 and 5 am she felt griping pains. She suspected that her labour was coming on and walked to a friend s house 600 yards distant to be confined When she had proceeded half way she was sud denly delivered while in the erect position, and her child fell upon the payement The naval string was ruptured transversely 4 inches from the navel, and the placents was expelled She walked to the place where she intended to be confined, carrying the child which she had wrapped in a petticoat This was her first child, it was well nourished and healthy looking The only injury it had sustained by the fall was on the left parietal bone at the junction with the coronal suture there was here a soft tumour between 2 and 3 inches in its transverse diameter, which was slightly ecchymosed Both mother and child did well and the tumour entirely disappeared at the end of three weeks. The cord was tied after the woman's arrival at the house Taylor, Med Jur, II p 899, from Lancet, I , 1854 p 637

Tunding the cord form across supports the surposition that such an accident has occurred. The average fronts of the could be applied to the could be applied to the could be applied to the could be applied to the could be applied to the could be a common mode of infantisule. Inclinately always to the head is a common mode of infantisule. In homeoidal cases the amount of violence craphoged is usually very great on the whole, therefore, if death has resulted from injury to the beed and there is no fracture or punctured wound of the skull, its almost certain that death was due to accident. Slight fractures of the skull homes are also perfectly consistent with accident. Extensive mury to the head is strongly in favour of homicide especially it accompanied by a cut cord and maccompanied by severe mury to the mother.

- 5 Syncope or shock.—This may occur from (1) Hæmornhage from the divided cord, (2) External wounds, (3) I ractures or other internal mournes
- (1) Harmorrhage from the dauded cord is more bledy to occur (a) when is has been cut across with a sharp naturment, than when it has been divided with a liunt one or torn anunder (b) when it has been dauded close to the unblidues (c) when it has been dauded close to the unblidues (c) when it has been dauded close from the cord may possibly but not necessarily occur —(a) If the cord has not been test and may occur even if the cord has been torn and not cut by positioneous rapture of the cord may occur during televiery the usual mode of death from this accidents, however, asphyrm not succept. (b) From the lagiture not being the lauficential tight or not succept. (b) From the lagiture not being the lauficential tight or hemorrhage from the divided cord it is important to note (a) whether or not the tree on left the cord appart to have been cut, and (b) whether or not the tree on left the cord appart to have been cut, and (b) whether or not a mark of ligature is present
- (2) External wounds Death from avacope or shock, the result of external wounds as usually homescal Tais external wounds any however be the result of accelent e.g. from broken intensits, or the result of an ol steric operation. The inture of the major may show whether it is the result of accelent or design. Fatal injury, it may be noted may be caused by wounds when heave hardly any external manufacture of the result of the result of the result of the property of the result of the property of the result of the property of the result of the property of the result of the special dank through the orbital plats of the frontal hone or through the back of the neck into the spinal cord or lumin, or the throuting of a sharp instrument down the throat or up the rectum. Cases have occurred of the employment of cased of these methods. Such impress obrough strongly indicate homicale but Ogston it should be mentioned, records a cave of death trom accelental throating of a small parthrough the
- (3) Fractures or other internal injuries—Just as fracture of the silin may occur before during or after delivery, so fractures of other bones or dislocations of joints, may similarly occur. Cases even are recorded of women who have met with no see lent during pregnancy, being after an easy labour, delivered of an infant with more than one of its long bones fractured or dislocated. Fractures or dislocations are not lakely to prove immediately fatal, unless the neck be the seat of the

injury Twisting the neck is a frequently employed method of infanti-cide. Very great force is required to effect this, and hence death from this cause strongly in licates homicide. In one case a woman in her unaided efforts to effect her own delivery, the case being one of breech presentation, employed so great an amount of force, apparently without homicidal intent, as to tear the body of a child completely away from rts bead 1

6 Infanticide by poison.—In India poisoning by opium is said to be a commonly employed method of infanticide; and it is alleged that in some cases a peculiar mode of administration is adopted, viz, smearing the mother's nipples with the drug. Opium is largely used (in India as crude opium, and in Furope in the form of syrups containing opium) by women of the lower classes and by nuises (ayahs) to keep young children quiet. Hence accidental cases of the poisoning of young children by opium are of common occurrence Other poisons said to be used in India for the purposes of infiniticide are arsenic, tobacco and 'madar' (Calotropis sp ), see 'Poisons'

Taylor mentions cases of intentional poisoning of young children by arsenic, sulphuric acid and phosphorus scraped from the heads of lucifer matches Accidental poisoning of young children by arsenic has been known to occur, as for example, in a recent case in England,2 where a number were poisonel by the external application of arsenious oxide, introduced as an a lulterant into 'violet powder It must not be forgotten that in new born infants post mortem appearances simulating those of irritant poisoning are sometimes met with as the result of disease eg injection of the mucous membrane of the esophagus, and ulceration of that of the stomach and intestines Such appearances have been met with in the bodies of plump and fat children 3

# (c) Death from Neglect or Omission.

Omission or neglect may be culpable -Section 32 of the Indian Penal Code states "In every part of this code, except where a contrary intention appears from the context, words which refer to acts done extend also to illegal omissions" Death from neglect or omission may be accidental or intentional, and causing death by an intentional and illegal omission may or may not amount to murder The principal forms of neglect or omission likely to cause death are-

1 Omission to provide assistance during labour.—This may result in the death of the infant from suffocation head injury from a fall bemorrhage from a ruptured cord, etc. etc (see 'Death from Violence') Two questions which may arise

Beng Med Leg Rep 1870-7, p 314 See Arsenic Chap XXIV Ogston's Lect Med Jur, p 272

in such cases are (1) Is it possible for a pregnant woman to remain ignorint of her state up to the time of her deliver? That this, in exceptional cases is possible, has already been pointed out (see 'Fregnancy,' p 27.5), and (2) Would a newly delivered woman be capable of the exertion necessary to save the life of her child? As regards this second question, it may be remarked (a) that in rare cases women have been delivered during profound natural sleep (see Case below), and (b), that in some cases women have been known to go through a considerable amount of exertion immediately after delivery (see following case) As a rule, however, a newly delivered woman is carable of but hittle exertion.

Case—Unconscool delivery during sleep in a primapara.—Dr. W. Case, of Chicago attended a primipara whose delivery took place during profound sleep. During the day on which delivery took place also had been feeling unwell but attributed this to over fatigue on the previous day. Delivery took place rapidly and the woman after it was complete woke up in a fright having dreams that something was the matter with her—Chevers Mr.I. Jur. p. 767.

Cite—Extraordinary exertion immediately after delivery —A woman aged 40 a servant in a Bengal household was delivered unassisted in an erect posture of a mature child in the privy of her employers house at 11 a.4 on the 6th It-Chrunzy, 1893. Sh. was doin; her duties up to the time of going to that outbourse and she lost much blood. The placents came away in about a hour. She wripped the child in rap placents came away in short a hour of a work of the child in child tool form it, head the property of the child in the chi

Care—Exertion after delivery—1 lirahman widow after walking two miles was delivered of a maturo made child and learning in the dry bed of a atream wall ed back to the house from which she had started. She was tred for exposing her infant and the judge held that the facts of the case were monoasterie with the defence viz that she was in had health at the time and from bewilderment and pain was junaware of what she was doing—Chevers Ved Jar p 745

2 Omission to the the cord after dividing it—If a woman has been delivered without as istance proof that the cord has been cut not form indicates that ability existed after delivery for a certain amount of exertion. This, taken with the other circumstances of the case, might support the supposition that the omission to the was intentified. Previous to examining the cut end of the cord, this if dr., should be softened.

in warm water. A clean smooth edge indicates that the cord has been cut, a ragged edge may be the result of division with a blunt instrument or rupture

Cheers gives the following description of the manner in-which the umblucal cord is divided and dressed by native women in this country. In many parts the cord is not divided until after the placenta, or after birth, has come away. It is only ted with one lighture, near the child, and, before tying, the blood is either pressed towards the child or towards the placenta according as the child seems lively or otherwise. The cord is generally divided by a piece of bamboo, and a fact of the cord being found with jaeged adges is thefefore no proof of neglect. In order to induce the mother to bring forth the after birth, it is usual to put some hair into her mouth. This causes her to try and vomit, and the effort brings away the placenta. It is also usual to observe certain religious ceremonies before cutting the cord.

3. Omission to supply the infant with food or to protect its body against cold may cause its death—In the first evec, absence of all signs of the presence of food in the alimentary canal may, it is possible indicate the cruse of death. In the second case, there may be no distinctive post mortem appearances present. Sometimes this omission takes the form of "abandonment of the infant. This is af offence, even if death does not result, for by \$ 317 of the Indian Penal Code, "Whoever being the father or mother of a child under the age of twelve years, or having the care of such child, shall evpose or leave such child in any place with the intention of wholly abandoning such child, shall be punished with imprisonment of either description for a term which may extend to seven years, or with fine or with both." For a currous legal point arising under this section sec Case below, R. y. Beçoo

Case—Alleged abandonment of an infant.—In this case the following facts arose A the mother of a newly born child, being herself too ill to move, sent B to expose it Is was held by Scotland C I, that A could not be convicted under this section (a \$17\$) as seh and not actually exposed the child, nor B as she was not the mother. Also, that neither A nor B could be indicated for abetting the other, since as neither could have committed the offence there could be no abetment by the other Or course, a person who has the custody of a child mergy for the purpose of exposing it, cannot be indicted as a person "having the care of such idl."—If V Begoo, 1st Mad Sess, 1889, Maynes Fenal Cole, p. 275

Lastly, by s 318 of the Indian Penal Code, it is an offence "by secretly burying or otherwise disposing of the dead body of a child, whether such child die before, or after, or during its birth." to intentionally endeavour to conceal 'the birth of such child." Women are frequently convicted under this section when the evidence fails to support a graver charge

# Examination of the Alleged Mother.

SIGNS OF DELIVERY.

The signs of previous delivery, in cases where the signs of recent delivery are absent, have already been discussed (see p. 296). The question may, therefore, now be limited to recent delivery. Does this woman exhibit signs of baring been iccently delivered of a child? On examination during his of a woman who has recently been delivered of a mature, or nearly mature, child, the following signs will usually be found—

- 1 A general appearance of indisposition.—This how ever may be present in women, who have not been recently delivered as the result of any severe illness. Again this sign may be absent in women who have been recently delivered Some women especially those accustomed to labour, appear to be constitutionally but little affected by delivery, and are crabble inmediately afterwards of resuming their work or indergoing severe exertion. Chevers on the authority of Ward, states that poor women in the northern parts of Bengal are known to attend to the business of their families the day after delivery and that sometimes a mother is delivered while at work in a field carries home the child and returns there to work the next day. For an instance of very considerable exertion directly after delivery see Case, p. 346
- 2 Organs of generation swollen, contused, or even laccrated -A laceration of the fourchette is usually found after deliver; in primipars. The os uteri may also be found lacerated and is dilated and soft. The uterus is charged, and Ogston' romarks may for the first two or three days be found to undergo alternate contraction and relexation under pressure of the hand applied to the abdonen. The abdonniarl partiers are relaxed the linese albeautes apparent and a dark line is seen extending from the pubes to the invel.
- 3 Breasts, as in advanced pregniney, are full and prominent, and the nipples surrounded by well-marked arcole. Milk will be found exuding from the mpples
- 4 Lochial discharge.—The presence of this discharge is the most characteristic sign of recent delivery. It is at first coloured with blood afterwards become brown or green, and has a peculiar odour. The discharge may become almost

Med Jur . p 771

<sup>\*</sup> Lect Med. Jur . p 155

vholly suppressed about the third or fourth day under the nfluence of the milk fever, returning when this has subsided It usually lasts a week to a fortnight, but may continue longer Ogston 1 states that in some instances the lochia have been nown not to appear at all

Many of these signs may be present as the result, not of delivery, but of uterine or ovarian disease. No conclusion can, herefore, be safely drawn unless all or nearly all, the signs of ecent delivery be present . As a rule, the signs of recent delivery cease to be distinguishable after the eighth to the tenth lay, and the stronger the woman and the less severe the labour, the more likely are they to disappear rapidly. The earlier the period of gestation also at which delivery has taken place, the less marked will be these signs and the more quickly will they disappear For further signs of recent delivery ascertainable on post mortem examination, see 'Causing Mis-

1 Lect Med Jur., p 158

carriage, p 322

## CHAPTER AVII

## UNNATURAL SEXUAL OFFENCES

IRE desire for unnatural sexual intercourse so repu\_aant to the normal mind may be acquired or it may be due to per verted sexual instincts in which a man may be psychically a woman and vice verd. Even in the acquired sodomy which is so prevalent in the List it is probable that there may often be some slight abnormality of sexual passion present suice many men who have given themselves up to the most unbridled debauchery never develop any tendency to unnatural inter course. An unnatural oftence is defined by s 377 of the I I Code to be carrial intercourse against the order of nature with any man woman or animal and like in rape penetration is sufficient to constitute the carrial intercourse necessary to the offence

The law of lingland on this subject is as follows — Whosoever shall be convicte ! of the aboundable exime of buggery commuted either with mankind or with any animal shall be lable et et et (24 & 25 tet e 100 s 61) 
Turther from a decis on in England it would appear that consistinct the crime of buggery with mankind the penetimion must be anal introduction into the mouth was held not to constitute the Cince Whether introduction into the aniss is necessary to constitute the curnal intercourse with any man or woman contemplated by a 3st of the 1 I Code does not appear to have as yet been decided.

Three forms of unatural sexual intercourse are usually described namely (1) Sodomy or sexual intercourse between two human beings usually of the male sex (the converse form Tribadism or sexual congress between two human beings of the female sex is not publicly known) (2) Pæderastia or that form of sodomy in which the passive agent is a boy a catamite, and (3) Bestuality or sexual intercourse of mankind with the lower animals

Sodomy—This offence is largely practised in many countries and is extensively practised in India. Indeed Chevers mentions a case where two men convicted of this rime on their own confession defended themselves by putting

forward the plea that "it was their occupation". The offence is not uncommon in prisons, and it is a well-known prison rule that where more than one prisoner is confined in one cell, the number should never be less than three.

Sometimes the offence is practised between two men, either taking alternately the part of active and passive agent. In other forms of the offence, the passive agent is a boy, and in others, again, a cunuch. In the course of a trud at Manipuri in 1832 it came out that a great number of cunuchs regularly practising the offence exist in India, these go by the name of "hyrath," dress as women, and profess to obtain their living by dancing and singing at births and marriages. They recruit their ranks by castrating boys. \*as a rule making a clean sweep' of the whole of the genital organs (See also Injuries of the Male Genitals, p. 139).

In India as in Europe false charges of sodomy are sometimes made for purposes of extortion. Where the act has been done with consent the law regards the active and passive agent as equily guilty. In England, however, if one of the two is over and the other under fourteen, the one over fourteen alone is charged. In India the question of age in relation to responsibility for this offence is governed by the general exceptions of the Penal Code (is 82 and 83). As in the case of rape, the question of alleged capacity or the active agent may form part of the inquiry, or whether feeble minded

whether leeple minde

\* Med Jur , p 707

Signs of Sodomy.—1 Habitual practise of the offence—Male adults who habitually practise sodomy often affect efformate manners dress like women, etc., and, as already pointed out, the passive agents in India are frequently ennuclis.

Case —A Brahman, aged about 40, sought treatment for a boil on the pennaum On examining the 'bol,' I found it to be a typical Hunterian chancre, situated one meh in front of the anus, and on being questioned, the patient admitted that he might have contracted it from one of his friends. He volunteered the statement that he had been a pathic for at least twenty years, so I examined him for the classical signs of his aberra tion, and found none of these. The gentials were well formed there was no deformation of the anni region, no infundibulum or loss of riggs, and the tone of the sphincter was normal.—Sutherland, Ind Med Gaz, 1902, p. 246

The presence of a chancro about the anus, or of a gonorrheal discharge from the rectum, is, of course, strong evidence that the individual has been the massive agant in the affairing, and may be corroborative evidence of his having acted in that capacity.

<sup>1</sup> 2 Recent commission of the offence —If it is alleged that the offence has been recently committed without consent, both

\* Ibid , p 497

Med. Jur., p. 708 They are to be dutinguished from the similarly mutilated cunuclis, Juagus, who guard the harems in palaces and are relatively more respectable in their habits

parties should be examined for marks of violence indicative of a struggle, as in a case of alleged rupe; and whether the act has been done with consent or not, the alleged active agent should be examined in the same way as the accused in a raps case. Examination of the passive agent may show stains of blood, or seminal fluid or characteristic genorrhead discharge on his clothes or person in the neighbourhood of the part; or it the individual is a young boy or a person unaccustomed to the offence, there may be found about the anus brusing or excornations of the mucous membrane, or, perhaps, slight laceration of the sphincter. Obviously, also, the question of the age of the purties must be considered, seeing that this bears on the question of their criminal responsibility.

# Bestiality.

The form of this offence in which a human male is the active agent is tolerably frequently met with in India. Cases occur every year in which the offence is alleged to hate been committed with a goat, a mare, an ass, a cow, and even a hen. In these cases, matters removed from the vagina of the animal with which the offence has been committed, or adhering to the surrounding hairs, may have to be examined for the presence of spermatozoa. Detached hairs may also be found adherent to the person or clothes of the accused, and may have to be examined as to the identity or otherwise of their appearance, with the hairs of the animal employed, as the passive agent.

## CHAPTER XVIII.

# INSANITY AND THE STATE

Unsoundness of mind or Insanity is a disease or disorder. The general tendency of all mental disorders being to disturb the balance of social environment, it frequently expresses itself in the form of a crime To guard against this the law places persons of unsound mind under restraint, and the medical jurist is chiefly concerned with the diagnosis and certifying of the fact of insanity

An instane person is not held responsible for any crime he may commit, and insanity may be accepted as a reason for divorce or for contesting a will. The plea of insanity is sometimes set up dishonestly by the defence in criminal cases to try to escape from the prescribed punishment which would otherwise be imposed by law as a deterrent to sane persons of criminal tendencies-for the safety and security of society is the true object of all legal punishment. While there is thus a danger in too readily acknowledging the presence of insanity as an excuse for crime, the plea of insanity might perhaps, in the interests of society, be set up oftener, as the most serious criminal, the congenital or instinctive criminal, is morally ansane, and the community would be better protected against an insane criminal by his permanent incarceration in an asylum than by his being sentenced to a term of imprisonment, after which he is set at large again

According to modern psychologists all crime is due to a latent or active neurose or physical defect or degeneration of the boars (but see 7, 21),

Prevalence.—A false impression of relatively low prevalence of insanity in India is apt to be gained by comparing the Indian official statistics of insanity with those of Europe In the latter case the greater number of positive insanes are registered and confined in asylums, whereis in India only if relatively small proportion are so confined or registered, and these largely of the more dangerous criminal class. No doubt the lower state of civilization of the Indian masses would imply

a somewhat lower percentage of insanes. For as has been well expressed by Professor Powell, Insanity being chiefly exhibited by mability to live up to the dictates of the society to which the individual belongs it is natural that the higher the standard of civilization the greater the number of individuals who full short of the standard. With a lower standard the number unable to pass becomes less and in a savage community there are nominally no lunatics. The census of 1901 revialed a proportion of only two insane persons for every 10 000 of the population as a runst about an average of 33 for the correspond in\_ population in Ln\_land. But not only are very many cases of insanity concealed especially among women-the stigms of family insanity being no less acutely felt in the Orient than in the Occident-the Indian figures are fallacious in that many idiots chiefly cretins and deaf mutes all persons who are weak minded and all those whose insanity is adjudged by the un educated enumerator or by the friends to be of a temporary character are not lly excluded All these persons would be re turned as insine in England , the statistics of the two countries are therefore not comparable. In further proof of this refer once may be made to the special investigation of 327 deaf mutes none of whom had been returned as also means at the census yet no fewer than 153 of these were found to be mentally defective to a greater or less degree The number of deaf mutes in India is very great viz 153 168 and it is probable that more than half of these are also meane. Besides there is an enormous class of religious mendicants sadhus and fakirs-non existent in Fulore-the majority of whom are certifiably insone and many of whom are very day perous unsanes although they are per mitted in virtue of the superstitious reverence in which they are held by the masses to roun about The relation of these va\_als nd ascetics to the prevalence of crime and insanity in India is as important as it is interesting as we shall find

The majority of Indian incurse are detained and cared for in their own homes. Of the total number enumerated in 1901, viz. 22 041 only about a fourth were lodged in asylums Nearly 20 per cent of the sylum population in India are criminals while only 20 per cent are women. This secual proportion of the insanes in India is in marked contrast that in London where the annual report of the Metropolitan Asylums Board for 1918 gives the numbers of males as 2393. The explanation of the Indian figures.

is probably oning to the seclusion of women

Causes —The causes of meanity may be broadly classed as physical and moral It should be remembered however, that

in nearly every case of insanity there is more than one factor, either predisposing to or actually exciting the condition

Physical—In many cases of insanty, there is an obvious defect in the nerva centres of the brain to account for that impurment or derangement of the brain which we call in sunty. But in others the defect if present is not apparent to the pathologist. The chief physical causes are

- 1 Congenital defects in constitution—This may show itself as arrest of development occurring before or soon after birth giving rise to amenta (p. 358). In such cases there may or may not be visible head deformity—The arrest of development may be due to changes interfering with the growth of the skull bones as in cretinism (p. 361). Hereditary insanity may come under this head—At Berhampore—Bengal among 575 male patients treated during 1907 in 46 a definite history of here ditary or family tendency to insanity was obtained, but it should be observed that the records of most of the patients are imperfect and it is not possible to trace their antecedents.
- 2 Injury or disease—Epilepsy injury to the head and sunstroke may all give rise to insant; Buchni and Tuke estimate that epilepsy is the cause of about 6 per cent of the admissions for insanity into asylums. In 28 out of 575 male insanes treated at Berhampore in 1907 the insanity was due to epilepsy cases of congenital defect combined with epilepsy being of course excluded. Wasting diseases eg tuberculosis specific fevers uterine and ovariant disorders may give rise to insanity. Pregnancy is sometimes accompanied by insanity the patient often recovering after delivery. Insanity has also been triced to the changes of puberty to the onset of semility, and to the effects of the menopuise. Intestinal irritation a torue factor probably has also caused insanity.
- 3 Intoxication by the use of drugs, such as Indian hemp and alcohol—In 1907 out of 5474 insanes in Indian asylums in 602 the insanity was ascribed to hemp drugs, in 135 to alcohol and in only 31 to opium. The smoking of Indian hemp either as ganya bhang or charas\* is the most common cause of insanity in India Of 575 male insanes at Berhampore in 1907 51 were cases definitely due to previous indulgence in ganja and in a number of other cases there was a probability of this factor having had greater or less effect of hemp drugs in the causation

<sup>3</sup> See for Ganja etc p 369

of insanty in India has been overrised, while, on the other hand, it was distinctly underestimated by the Hemp Prings Commission of 1894. As Major G Ewens has shown, about 20 per cent, of the insanty among males can be attributed to the abuse of hemp drugs.

Alcohol, such a common cause and such a potent contributory factor to insanity in Europe, is not so in India, where spirit drinking as has been stated above, is not common

Opium is an uncommon cause of insanity.

4 Shell-shock.—Since the Great War, shell-shock, which offer induces a condition bordering on insanty, has been alleged as an excuse for crime, and accepted as such by Courts of Justice The shell-shock neurasthenic is subject more or less to moods of depression and irritation, which may occasionally result in crime.

Moral.—Moral causes are graef, domestic trouble, relignous anxiety or excitement, and mental overwork. In Inda, in 1906, out of 2777 insanes in whom the cause was shown, in 776, or nearly 30 per cent, the cause was of a moral character, chiefly graef or religion

General signs-Delusions -The disordered mind in insanity may be the subject of delusions or hallucinations, though the absence of either of these in undoubted cases of insanity is not uncommon A delusion' is a perversion of the judgment whereby the individual accepts as real an erroneous perception or conception which has no real existence, hence a delusion, if not removable by the presentation of facts and powers of reason, is evidence of a disordered intellect. The delusions of an insane person concern his own personality 'Illusion,' on the other hand is merely a false perception by the senses of an external impulse. It is objective with no disorder of the reasoning faculty, for the affected individual on closer inspection perceives that he has been the subject of a false impression Illusions are mostly visual, but may affect other senses, such as hearing and smell. A common instance is when in a dimly lit room a person supposes he sees the figure of a man, but on closer inspection finds it is only a suspended coat The spectacular display of 'Pepper's ghost' is an illusion Hallucination is differentiated from a delusion in that it is an erroneous perception without an external impulse. It may affect more than one of the senses If it be rejected by the reasoning faculties there is no insanity, but if accepted by

<sup>1</sup> Ird Med Gaz , November, 1901 and Irsansty in India, 128, etc., 1908.

them, a delusion results. Hallucinations of hearing are the most common in insunity, the person hears voices speaking to him when there is absolute silence. In delirium tremens there are hallucinations of sight

# Forms of Insanity.

That group of disorders of the brain which is called 'insanity' comprises such varied conditions with overlapping symptoms that various classifications of an arbitrary kind have been proposed. In the present state of our knowledge any classification of insanity must necessarily be provisional. For medico-legal purposes, however, we may classify the various types of insanity as follows —

- I Amentia, or 'Dementia naturalis,' congenital insanity due to the arrest of development of the nerve-centres
- II. Dementia proper, or 'Dementia adventitiazel accidentalis,' degenerative acquired imbeculity, due to degeneration or failure of the nerve-centres
- III. Acquired active insanity from disorder of nerve-centres

The chief forms within these groups may be roughly tabulated thus —

# Classification of Forms of Insanity.

1	(congenital)	(Complete, or Idiocy, including Cretinish (Partial, or Imbocility	1.
11	DEMENTIA	Primary from masturbation etc (D precox) Secondary apoplectic and epileptic, syphilis, sunstroke, etc Senile Paralytic, general paralysis of insane (G P1)	
п.		ISTELLECTUAL (General (Torne MASIA and Epilephie, etc (defusionii) (Fartini (Melancholia  MORAL (General (unbridded depravity Kleptomanis I)	puerperal, alco hol, hemp, etc , usually tempo rary Manua Monomania and hypochondria Hypnotism and somnambulism

<sup>1</sup> See acute primary dementia p 362

#### I Amentia

In this form of insanity the individual is of un our limit from birth. Hence aments corresponds to what legal writers call doments naturals or the fool natural. Two forms of aments are recognized by medical writers namely (1) Complete aments or nicocy and (2) Partial aments or imbeculty, and Cretinism may be added as a third form.

- (1) Complete amentia, or idiocy In this form of amentia the arrest of development not only affects the ligher or intel lectual nerve-centres but appears also to affect the centres of sensorial perceition. Hence, in the fully developed form of complete amentia the individual carries on a mere vegetable existence not laying the sense even to eat-or drink. In the more common and less developed form there is a certain amount of intelligence the individual recognizes his friends is capable with extreme difficulty of acquiring a certain amount of edu cation and is able to make his wants known by signs or imperfectly articulated words. In almost all there is visible bodily deformity the cranium is small its vertex depressed and the forel ead retreating. The palate is narrow and unduly arched the face seems to occupy the whole of the front part of the head the expression is vacant there is often squint hare lip or other eign of non-development many are deaf mutes. Their hal its are often disgusting their sense of taste or smell being frequently defective they eat or drink anything filthy or not Some pass their evacuations unconsciously
- (2) Partial amentia, or imbecility—It is difficult to draw any precise line of demarcation between partial and complete amentia. In imbecility however there is not that marked want of development of the centres of sensorial perception which is present in idoor. Guy and others regard possession of the faculty of speech as the character distinguishing timbe cility from idoory. Two forms of mid cellity have been described a properly (1) tradepartial productive and (2) Moral impediation.

namiely (1) Intellectual imbeculty an i (2) Moral imbeculty Of the two intellectual imbeculty is it is form which most clorely approaches to idicey in its characters the affected individuals in well marked cases only differing from those suffering from complete omenta in its less pronounced forms in possessing the power of speech. Intellectual imbecults although markedly definent in general intellectual power are capable of acquiring an amount of education sufficient to fit them for carrying on dutter requiring no great metal effort

(see Gass (c) and (c) below) In moral imbeculty the defective development appears to affect chiefly the higher functions of the brain, the affected individual, although fairly\_intelligent and shrewd, being seemingly deficient in moral sense and in power of self control (see Gass (f) and (g) below), his mental condition in some cases closely approaching to that present in moral mania. It may further be noted that in some cases of imbeculity the individuals are greatly "under the dominion of childish fancies" approaching in character to delusions (see Gass (g) below).

Imbeeles may commit such serious crimes as murder. In Eastern climes where there are generally agabouds liable to be abused and teased beyond endurance on account of their grotesque appearance or their foolish behaviour, they not infrequently retaliate on their aggressors. Of twenty-one imbecoles or idiots in the Berhampore Asylum who had been charged with various crimes, chiefly thefts, five had committed murders and

two greevous assaults (see Cases (a) and (b) below)

Gase (a)—Imbealty (high grade) with homici al propensity—B B, a Hindia mile admitted to Berhampur Asijum in August 1895 A con genital imbeale whose father was insane and whose brother committed swiede A native of Birbhum One day he went with his wife and child to cut wood and while employed thus he suddenly murdered them both without apparent motive or cause A foolsh looking high gride imbecule, fairly intellectual and capable of simple work Can talk but rarely does so Memory very defective—C J B Milne 1098

Gase (b)—Imbeculty (low grades—without epilepsey)—Lali Lodina ad mitted in 1904 at the age of 18 charged with theft Some years previously had been convicted of theft and was then discowned by his relatives and became a vagabond thref—4 smiling lappy imbecule, with a fair amount of general mitelligence—Childiah in manner and behaviour Speech limited to a few words—A very willing general help—Perfectly harmless—Has shown no threing propensity since admission probably because he has been well cared for, and his desires for food, clothing etc., have been satisfied—CJ IR Minle, 1908—

Case (c)—Intellectual imbenity—'A man of forty, of weak intellect from birth but capable of such education as fitted him to be a copying clerk. He fell into bad company, committed theft and was tried and acquitted on the ground of insamity. In general be is quiet, moffensive and tacturm, but answers simple questions rationally. Ho is subject to frequent attacks of excitement preceded by shuffling of the feet. In these attacks which last several days, he talks incoherently, in restless and will strike and lack those about him. When he was about thirty years oil he shut the door of his room placed a long form close to the fire, lad hunself on the form, and his flead on the grate. He was found measurable but on being removed to an open window, had copious bleeding from the nose, and soon came to his senses. His head was burnt to the bone'—Guty, For Vied', p. 164.

Case (d) —Intellectual imbecibity —John Barchy was tried and executed at Glasgow, in 1883, for the murder of one Samuel Veilson Barchy

had shown some affection for his victim but killed him that he might possess hims. If of three one pound notes and a watch, which he took from hum. After the murder Barclay hovered about almost without disgues, and while going to spend part of the money with the first person he metdropped first one and then another note at his feet. When questioned, he could see no difference between killing a man and killing as no, except that he 'would never hear him fille again,' and he looked on the watch as an animal and when it stopped, thought it had had of clot watch as a satimal and when it stopped, thought it had had of clot Joed Birchy and had not consider the stopped and the property of long threby some property of the property of the property of him as unbelow, and had nover been able to give him any religious instruction, and did not consider him a responsible being "—Guy's Factors of the Unsound Und, p. 173.

Case (e) -Moral Imbeculty -Cuthbert Carr gave himself up to the police, confessing to the murder of a female child aged air. By his own voluntary and detailed confession he choked the child while he was having connection with her to prevent her informing against him He had been attacked with renercal disease, and his object of having connection with the child was to cure himself. After the murder he showed great shrewd pess in the measures he adonted to avert sugmeton. In his confession he stated that he knew doctors could not, or would not care the discase, that they did their best to protract a disease, and, when they could not protract it any longer killed their patients, that they poisoned the wells in choicea time, etc etc Dr Browne reported that he found him to be labouring under mental weakness or defect, probably congenital, and that his general appearance and manners were such as are usually associated with partial mental defect or eccentricity. That otherwise he was of fully average intelligence expressing himself with accuracy and facility that his powers of calculation and memory were unusually acute, and that he was perfectly capable of distinguishing between right and wrong He was acquitted on the ground of insanity - Browne's Med Jur of Incanity, p 71

Case (f) - The Windham Case - In this case W F Windham was alleged to be of unsound mind and incapable of managing his affairs It was proved that he had been sent to Eton, but that he had profited very little by the means of education which were placed in his power He was wholly unlike other boys and when he came of age, in 1861, his conduct was such as to lead to a belief in the minds of those who were acquainted with his position that he was mane It was further proved that he was utterly deficient in business capacity, that he was ex travagant in purchasing articles which he did not require at exorbitant prices and in unnecessary quantities that in consequence of such acts he incurred enormous debts without having any reasonable prospect of bring able to meet the demands when they became due, that he was guilty of gross indecency of language and conduct in public places, and that even the presence of ladies was not a restraint, that his appetite was voracious, that he associated constantly with people of the most indifferent character, that three weeks after he came of age he married a woman of disreputable character and life, that he married her knowing that up to the night previous to the marriage she had lived with one of his friends as his mistress, that having married her, he infected her with the venereal disease, and subsequently presented her with lewellery of the Value of from £12 000 to £14 000, and settled £800 a venr on her for life, that his income, at the time he did this, was not more then £1500 per annum. The evidence went further to show that although his wife, subsequent to her marriage, collabited with another man, Mr Windham condoned this act by resulting with her even after her adultery, that he was in the habit of acting as a railway guard, wis carcless as to personal cleanliness and on occasion displayed an inter want of feeling. There was great conflict of medical testimony in this case, but the result was that the jury, by a majority, returned a verdict that Mr Windham was of sound mind, and capable of taking care of himself and his affairs—Browne, it, p. 67

Case (g)—Imbecile dominated by a child-sh fanov—'A young genthe man, aged wenty was the slave of a childsh fanov for windmills, with an aversion equally strong to water mills—Having been placed under control in a place where there were no win limils, he cut the calves of a child's legs through to the bone and stated that he would have taken away its life, that he might be tred for his act and removed from a place were there were no windmills—He had always been violent when thwarted in his fanot, had threatened his keepers and members of his family, and had more than once made preparations for committing murder'—Guys For Vide 1, p 106

To these may be added as a third form -

(3) Cretnism —This is the name given to a form of endemic \( \) diocy prevalent in certain hill or sub montane districts, and apparently the result of local conditions. It is met with in the Sub Himalayas in India and probably due to gottre in mother and dependent on developmental changes interfering with the growth of the skull bones. It is usually associated with atrophy of the thyroid gland in the individual or with gottre in his parents. The skin is usually coarse and dry.

Cretinism or Infantle Myxoedema is a condition brought about by absence or faulty development of the thyroid gland It is endemic in association with goifre among adults in certain hill districts and valleys, such as parts of Switzerland, Triol, the Himalavas, and the Kassiya and Janita Hills Spordic casos also occur, generally as a result of atrophy of the thyroid following some specific fever

Symptoms.—Toward the end of the first year of life it is noticed that the child is mentally dull, makes no effort to crawl, walk or speak, and takes no notice of its surroundings. It is then seen that the child has ceased to grow, that the skin is rough; and dry, the hair dry and seanty. Later it is observed that the face is heavy, pasty and bloated, the nose, flat, its ale thek. The reylads are heavy and puffy, the lips tinck and pendulous; the tongue, large and swollen, hangs out of the mouth, allowing saliva to dribble, and gives the child a particularly fatuous expression

Ossification and dentition are delayed, and the child grows

up an imbecile pot bellied dwarf with short, thick and stumpy arms and lees

Case — Cretmism.—Hindu woman aged 18 Height 28 inches Looks like a pot bellied baby two years old Cannot stand without holding some object such as a chair Imbecile cannot speak. The only soin? she utters is to gurgle Goo goo occasionally Never plays or takes interest in anything Never signifies that she wants food. Defecates and michigates without notice on her clothes or mat. Her face is fatuous and utterly devoid of expression. Her abdomen is pendulous so that the pubes are concealed when she is erect. Her calves and ankles are of the same dumeter. Her breasts and pudenda are infantile. There is no hair on the jubes or in the axillæ. The hairs of the scalp are very sparse and do not exceed three inches in length though they have never been cut

She was treated with thyroil extract rather irregularly and intermuttently with considerable improvement, so that two years later her

condition was-

Height 34 inches She keers her ton me inside her lips, which have become much thinner and are kept shut. She smiles quite smiably when any one she likes approaches There is a difference of two inches between the circumference of the calf and the ankle. Her breasts have considerably enlarged. The hair of the scale and evel-rows has become nearly normal in it ickness. She walks but is lazy. Plays with toys calls for food when hungry. She cries smiles gets angry or salky on appropriate stimuli like children of four or five years of age. Is clean in her habits and is developing a little womanish variety. She has a see shulary of about a hun ired words -- Frofessor Powell's Reports, 1917

# II Dementia

Legal writers use this term as synonymous with insanity. grouping all cases of mental alienation under the two heads of (1) Dementia naduralis or the fool natural, se individuals insane from birth and (2) Dementia adventitia, or accidentalis te an acquired imbeculity -individuals who become insane after barth 3

In medicine the term dementia is employed to denote that form of meanity in which the mental powers having attained maturity, subsequently ful the individual falling into a condition more or less resembling amentic, but distinguished from amentia by being the result of failure of power previously present and not the result of original want of power Dementia may be acute, that is, come on suddenly or chronic ie come on slowly and may be secondary to follow on a previous attack of mental or other disease, or primary to come on unpreceded by any such attack Occasionally dementia is both acute and primary 2 Acute may follow a serious attack

Guy Tor Med p 166
 In India scate primary dementia always rare is when met with generally a result of sunstrake

of brain or other disease, eg typhoid and malarial, or cerebrospinal fever, etc Recovery may take place from acute dementia The form known as Dementia pracees, which comes on soon after puberty, and whose exciting cause is often sexual, is not uncommon in India

Usually dementia is chronic, and secondary to an attack of ocute main or melancholm, or it may supervene as the result of old age (semile dementia). When dementia comes on slowly, often the first symptom noticed is failure of memory. This is followed by general duless of all the mental faculties. The bodily health is usually good. In very advanced cases the functions of the centres of sensorial perception become impaired tinctions of the centres of sensorial perception become impaired—indeed, insensibility to pain is often noticed in the early stages—and the animal instincts even are lost rarely, if ever, takes place from chronic dementia. Bementia may be accompanied by occasional attacks of miniacal excitement.

Case —Primary dementa (Dementa praecox) —B Ch R admitted into the Berbinnpore Asylum in January, 1901, from Airshangar Hindu male, aged 22 years It father and his only sister were both insane. Until the age of 16 he is said to hive been quite normal. He then became rapidly dull and stupid and fell into the state in which he has continued for six years. Condition on admission.—A dull stupid looking man of poor physique, with saliva diribbing from his mouth. I settermely fiftly. Will not speak and pays no attention to anything After admission he improved somewhat for a time. He speke occasionally, but only about his food. Has appetite poor at first then became vormeious aboultedly shameless mostlying operation of the first set of the continued to court as a fifth, dement with no thoughts but for our set of a fifth dement with no thoughts but for our set of a fifth, dement with no thoughts but for our large diffusion of the first property of the continued to court as a fifth, dement with no thoughts but for our large disease, and he died of this a year later — O. I is Mine, 1968.

Case—Secondary dementa (partial)—Bye, or Bhau, admitted on December 21, 1860 from Backergan, E Bengal, in a state of noisy aggressive mania which became chronic and which gradually led to his present state of dementias, in which he has remained for fifteen years A childish vagabond with a very defective memory and devoid of intelligence At times irritable if interfered with Has a voracious appetite and is very indifferent to clothing—C J R Mine, 1903.

Case —Senile dements — R. Ch. h., an old man of 70, a poor cultivator and labourer luving with his family at Midapore was caught one day stealing eight bundles of paddy (nice) and was sent to the asylum, having been certified misme and incapable of trial. A poor old man, dazed and foolish, habbling monoherently, very drity in his labits. Admitted in a state of physical debility, placed in hospital on admission suffering from heart disease. Dred three months after admission — CJ R Milne, 1908.

General paralysis of the insane.—This is the name given to a form of dementia, in which the failure of the power of the higher or intellectual nerve centres is accompanied by failure of power of the motor centres G P I is more common among men than women It frequently attacks men of education and Position Ithe tabes it is due to apphilis in 60 to 70 per cent giving a positive Wasserman reaction but as has been remarked both general paralysis and tabes are arrae amongst uncivilized or half civilized races notwithstanding the frequency of syphilis

Of 4200 Indian cases of institute coming under Powell's observation in the past sixteen years only three were GPI

Case (a) —G.P I m an Indian.—F M aged 42 a Mahomedan fireman on P and 0 mail steumer 5 and i e had syphilis twelve years previously Wasserman positive have seeks exagrerated. Punis con

tracted, insensible to light sluggish to accommodation

He has many cheerful delusions of greatness eg He says he has bought all the estates of thypu Sultan and is Imperor of Calcutta He has bought land worth five erores from Boku Babu and made him has Assistant Jemadar He promised me two cheques of fifty labbe each and han led me two ships bar chits He says he is a Judge and is going to lecome a burnier he know, all commercial works and is going to lecome a burnier how all commercial works and is properly the health of grants parameters from the property of the country of the common the common in boated with whish, so da champaque and port wine. He is annous to get to Delhi where he intends to crown his father.

He was sent to Yerrow la Asylum A year later the Superintendent informed into his condition had got much worse. Speech was thick and slurred definite paralytic symptoms were progressing.—Professor Jo well's

Reports 1917

Case (6)—C.P I in H adw.—12 Had syphulas in 1859 Was arrested in 1916 strolling about Government Hones grounds. He ernlained his action on the ground that he was Dmnya ki Malki Lord of the Earth Shah me-blah He says he has twenty a vee each wide has twenty four children He 1s Comm sationer of I olice and will this creming dismiss the whole force He says he is an electrical machine that all the lightning enters his body and is stored up as strength. He impregnates his wives by electr cly He has many motor cars and arrived just now in Hombay from tarritear (1235 miles) in less than an bour in his motor car Vo 20 304 (V B.—He has been two days in the pol ce cells). He has 27 400 lakhs of rupees in the Bombay Hank 27 daths of rupees in the National Bank 300 days in the same unount in the Imperial Buth. Yet he prostrated himself and seared my audicis begging me to give him a c gravite

seazed my ankies begging me to give him a c garette

H s pupils were irregular and sluggish his speech was scanned
deliberately and slurred his hps and hands tremulous Wasserman

positive —1 rofessor Powell a Reports 1917

The symptoms usually are failure of memory and of the intellectual powers generally—usual in dementia—accompanied by deluaions of possession of exalted power and boundless wealth. Along with these symptoms indicative of affection of the higher nerve centres impairment of power—first noticeable

in the tongue and muscles of articulation—is observed, in dicating affection of the motor centres. The pupils become irregular, the power of precise co ordination of movement necessary for the performance of what may be called acquired automatic acts, such as walking 12 lost, and general impairment of motor power supervenes. Apparently the centres of sensorial perception, as a rule do not become markedly affected until near the end of the case but as in chronic dementia, deficient sensibility to pun may be an early symptom (see Case p. 363). The deficient sensibility to pain is sometimes of medico legal importance (see 'General Intellectual Manra, p. 366).

The offences of a G P I may be classed under three heads 1 (1) Violence of a peculiarly brutish and irrational character, (2) Sexual impropriety, doubtless partly from lack of judgment and partly from the sexual irritability common in earlier stages, (3) Theft.

# III Mania or Raving Madness.

#### ACTIVE ACQUIRED INSANITY

Under this head may be classed all forms of insanity characterized by disturbance or disorder (as distinguished from want of development, or failure) of the functions of the higher nerve-centres 2 Unlike amentia and dementia mania is soldom continuous, there being usually remissions, more or less com plete. If complete a remission constitutes what is termed a 'Incid interval (see Case p 363) Mania may come on suddenly or slowly, if slowly certain premonitory symptoms are usually first noticed The chief of these are indigestion, constipution, and sleeplessness, altered or perverted sensations, sometimes amounting to illusions, great irritability, alterations of temper, disposition and habits and inability to concentrate the attention on any train of thought According to Dr Radcliffe, the leading mental characteristics in insipient insanity are -(1) Self concert the individual fancying himself wiser. richer or stronger than he really is (2) Misanthropy, or general dislike to others without cause, and (3) Suspicion, often leading to delusions of the existence of conspiracies to injure or poison the sufferer 3

Taylor, Med Jur , II p 467

<sup>1</sup> Dr C Norman Dublin J Med Sc December 1900

<sup>\*</sup> Some writers on insamty limit the application of the term 'mania to one particular form of mental disorder viz to that in which there is general disorder of all the intellectual powers coupled with excitement—what in fact when the term 'mania is used in the wider sense above stated may be called the nor melancholic form of general intellectual mania.

Case - A recurrent manua - This case exemilifies a type of inspecto which is not uncommonly met with in India, and which is perhaps the saddest of all the mental disorders to which human beings are liable -R K G, a high caste Hindu of good family and superior education, formerly a schoolmaster, became insane at the age of 23 through it is stated over study. It is important to note that there was no hereditary tendency to mental disorder and no marked previous alcoholic or other excess Admitted in 1895 at the age of 40 Fiery three or four months he suffers from attacks of acute mania, whose duration varies from fourteen to twenty eight days. During this period he remains naked is extremely filthy, obscene, restless, excited, and is very noisy, shouting and singing constantly. His speech, a mixture of English and Bengali, is extremely foolish, sentences such as the following being uttered — 'The pains of delivery are in my back!' He is very sleepless, and spends the night singing obscene somes. The attack lering suddenly but for a day or two prior to it there is a curious alteration in expression which the attendants are well aware of as heralding an attack. He may be dangerously aggressive at the onset and hence this alteration is carefully observed. Recovery is fairly rapid, and is complete. In the intervals the man is absolutely same. His memory is good except for the attacks of insanity, of which he remains currously oblivious -C J R Milne, 1908

# 1 General Intellectual or Ideational Mania.

#### MELANCHOLIA

In this form of mania there appears to be general disc, of the functions of the higher nerve centres. It is divisible into a non melancholic form and a nelancholic form, according as to whether excitement or depression is present. Some writers on instructly limit the application of the term 'mania' to the non-melancholic variety of this form of insanity, and apply the term 'guneral melancholia,' or 'lipmania,' to the melancholic variety. Sometimes the two forms blend, excitement and depression alternating with one another in the sume case

The principal symptoms of general intellectual manase—Bapad flow of ideas, expressed with confusion and incoherence, the attention is constantly wandering, and deliasions rapidly succeed one another. In one form the individual fears everybod, and everything (principholosa), in another he imagines limited particular the properties of the individual fears everybod, and everything (principholosa), in another he imagines limited? particular properties of the individual fears amain of delinium tremens. There may be furious excitement, or, in the melancholic form, great apparent suffering and the patient is often violent and very destructive, rendering great caution necessary in visiting him. The expression is altered, he sleeps but little, and there is often (especiall) if the cree is tending towards general paralyssy) deficient establisty

to pain. The fact that in this form of insanity there is often diminished sensibility to pain may be of importance in case where injuries received by insane persons form the subject of an inquiry (a) from its indirectly tending to increase the amount of injury likely to be inflicted during a struggle and (b) as bearing on the question of the time of infliction of an injury

A special form of general mania has an acute delirium as its chief feature and is invariably fatal, it is known as Acute Delirious Mania

Case — Acute del rous man a — In this case alcohol was a prominent factor as far as the first attick of manns was concerned. While suffering from this he was brought to the asylum and levend evidences of his recent alcohole bout there was nothing special about his attack. He then recovered almost completely but on the fourteenth day after the cessation of the acute sympton of the first attack he again leveloped acute manns accompanied this time by faver and delirium. To this he succumbed. The following are the details of the case.

A P Goanese aged about 2 employel in a railway refreshment room was admitted into the asylum on April 3 190. His friends stated that he had always been considere I a foolish person talking non sense on occasion and having generally exalted ideas about himself. On the night of March 23 although a usually temperate man be assisted by a frien I drank about a bottle and a half of whichy and after this he became acutely maniacal He was very excited abusive and noisy. He broke a quantity of glass and plate. He became very filthy and for three days he refused his food He was brought to Lahore and a limitte l as stated on April 3 He was ther in a state of exaltation with delusions of being a great chief of having served in great houses of having visited the Pope at Rome He sail he had been sent to the asylum by Christ etc Hehala vacant look and was extremely restless and loquacious He was very filthy with excreta and tore his clothes and bedding into ribbons He was no sy at 1 ght an I slept very I tile Under treatment he daily improve l becoming cleanly in lis habits respectful in his attitude and generally behaving quietly. He appeared to be reaching a normal state when rather suddenly on the night of the 21st he became again acutely maniacal lestroying his clothes etc and incoherent with temperature 101° On the 23rd still feverish (102°) and had become almost unconscious. On the 24th temperature rose to 104° when he was visibly del rious and he ded unconsc ous on the morning of the 25th. No post morten permitted -C J R Milne Ind Med Gaz 1906

Gare—Melanchol a of recent origin—M D a young Hindu aged 23 admitted from Midanpore on March 20 1901 Except that his maternal uncle was an idiot there is no other history of insantly in the family. In December 1903 his house was burnt down and at the same time his sister and other relatives died of small pox which was raging in the village. This caused him to become insone and in January he attacked his mother and wife one day with a kinfe. He was then arrested sent to just and thence to the saylum where he was admitted in a state of extreme mental depression weeping constantly declining to speak and paying no attention to anything. He recovered gradually and in November 1904

was declared same, and has continued in this condition —C J  $\rm R$  Milne 1909

Gase—Chronic melancholas.—B A Musalman woman. At the age of 32 is said to have had no children at burth, four of which were still born and one alive which died shortly afterwards. During these burths a methand fixth was caused and was left unfrended. This caused her to be an object of disguist, and her mind gave way unler the combined influences of boddy frouble and grid. In her means ratis else set first to a golown and was sent to the saylum where she has continued in a state of chronic mental dispersion. She is very irritable, as if it thurstred may be aggressive. She is always in a state of abject misery and no amount of kudness or comfort has any effect. Treatment of the unchard condition is negatived by her being in an advanced condition of pulmonary tull erculosis—C. J. It Villies, 1909.

Insanty with epilepsy.—Insanty consequent on epilepsy in the infrogentily seen in Idala. In most of the sufferers the epilepsy is said to have come on after puberty. Some of these epileptics are continuously instine while others are only insane before or after their serunes. The epileptic serure the classical grand mal, may be replaced by an attack of acute mining generally of short duration and from a medice legal point of view this is important. Epileptic instincts are among the most dangerous of all insanes and those in India form no exception to the rule. The type of insanity not with in epileptics is most commonly insanis but occasionally an epileptic melan cholia may be observed. Diementa generally comes on early in epileptic cases and is usually profound. Epileptics afer sorely tried during very hot weither, and are then hable to attack so of status evidenticus, frequently fatal.

Cas - Epileptic mania homicide - B P from Tributary Orissa began to suffer from epilepsy at the age of 25 in 1900. The first fit was a very severe one and he fell into a fire extensively sourring his left chest and arm On August 7 1905 he was sentenced to transportation for life or murdering his mother under the following circumstances Hi was seen one day to drag his mother who was I leeding from a wound of the heal from his house in his other hand he had a bloody axe Having deposited his mother's body he sat down quietly by his door and was arrested. It was then observed that he was in a dazed at ite He admitted his crune and said he had mistaken his mother for a tiger He had least his mother four blows any one of which might have caused death and one over right shoulder and nuch had severed the spinal cord It is not recorded, but it is possible that just prior to this murder the man had an epileptic service. It was observed in jail that after his fits he became willily excited and required restraint. He was then sent to the asylum. An unitable man who suffers from two or three major epileptic sergures monthly. Is dull and depressed before the fit and is very exe ted ununcdiately after for a couple of hours, and has then to be kept apart -- C J I. Milne, 1908

Toxic hisanity is most commonly alcoholic, or due to Indian home or purposal seess

1 Alcoholic insanity.—Insanity due to alcohol is now (1917) by no means rare in India

Case -Alcoholic insanity -R S, an aborigine from Midnapore, admitted in December, 1904, into Dullunda Asylum with the following history For many years had indulged excessively in native liquor (pachar-a spirit distilled from rice) On two occasions he had had attacks of acute manus During the second of these, which followed directly a bout of great intemperance, he came up one evening to another Santal who was sitting in front of his house, and without saying a word killed him with an axe. He was then arrested and sent to fail, where he was admitted in a state of wild excitement. He was then sent to the asylum. He was sane on admission, and continued to be sane until March, 1905, when he began suddenly to talk nonsense, and then fell into a state of stuporous depression. Some days later he was caught in the act of making preparations for committing suicide. This state of depression was followed by an attack of acute mania which was characterized by noise aggressiveness, and extremely filthy habits This gradually subsided after a duration of nearly two months. He then recovered and continued to be sane, and was sent for trial in September, 1905, and returned to the asylum in March 1906. In May 1906 another attack of depression with another suicidal attempt, was again followed by a period of manucal excitement, shorter in duration however than that of the previous year. He recovered completely and continued same for a year In August, 1907 ht had an attack of simple mania lasting for three weeks In January and Tebruary of the present year, he has had two successive short attacks, and his case is developing into one of recurrent mania -C J R Milne, 1908

2 Hemp drugs,—Major G. F W Ewens has shown that indulgence in hemp drugs is responsible for a great many of the cases of mania admitted into the Punjab Asylum. Of 543 such cases admitted in the triennium 1900-1903, in 161 their causation could be reasonably assigned to the hemp habit This proportion is very high, and is higher than in the Lower Provinces In Berhampore, of 332 cases of mania, in only 56 can indulgence in hemp be attributed as the cause. The reason of this, however, in all probability lies in the fact that whereas in the Punjab the more potent resincharas-is the preparation used, in Bengal it is ganja, a much milder drug With an experience of both provinces. I can further state that the toxic mania due to charas indulgence is much greater in degree to that seen after indulgence in ganja Both are, however, exactly similar in type The Hemp Drugs Commission came to the conclusion that hemp drug indulgence had been grossly exaggerated as a factor in the production of insanity, and that in very few cases could it be definitely shown that previous hemp smoking had caused the mental alienation

<sup>1</sup> Ind Med Gaz, November, 1901, and Insanity in India, pp 128, etc.,

That their conclusions were incorrect Ewens has definitely

proved as regards the causation of mania

Hemp drug indulgence, either as gangs or as charas, is common in many parts of India It is chiefly in vogue among religious mendic ints-the vagabond pests of India-and among the lower castes resident in the larger towns and villages Were it not for fakirs and sadhus, who extol its virtues the practice would soon die out Comparatively few persons then indulge in these drugs, were larger numbers to do so our asylum populations would become proportionately increased

The drug is partaken of in one of three principal forms-bhang ganja or charas Bhang is a decoction of the leaves, and is very mild as a rule, but it may be the reverse, and is then frequently adulterated with dhatura and other drugs Ganya ne the dried flowering tops of the female plants matted together by resm It is smoked along with tobacco, as is charas, which is the crude resin extracted from the flowering heads by rubbing these in the hands and scraping off the resin left adherent to the palms It is also contained in the sweet

meat Mainn which see

A single indulgence in any of these forms may produce a prolonged intoxication or a mania transitoria. Continued and excessive indulgence leads sooner or later, in many of these who indulte to an attack of acute mania of a noisy, happy, elated character, which varies in degree in each individual Filthy halits, expansive delusions, and a careless but dangerous tendency to aggressiveness are constant features Physical signs are psent except a peculiar conjuctival conge. on This state of uluma may last for a varying period. It may then be completed recovered from, or the subject may fall into a state of mild clyonic manir with weakmindedness, which is chiefly remarkable for its defects in memory of time and place period of mania in ganja cases is nearly always a period of Old hemp cases in asylums are remarkable for their false ideas of time. Their ages, as told by the a, are absurdly greater or less than the actual. Recurrences are common if the labit is esumed. The craving for the dr g soon passes off and the abrust manner in which the indulge ce can be stopped is remarkable. A few cases terminate in simplete dementia, but a very partial dementia is the common est issue of hemp mania

Case - Manua transtora following blang drailing — S. R., a Hinds to 17, was admitted into the sayium on Apil 1, 1905, unth the following lusted; "Lie hall been employed at A'nners by a Libu in some domestic capae. Vy Some difference of opinio p trid arrest between hum and one of this other services are the same and one of this other services."

to make up the quarrel and was induced to drink a tumblerful of bhang by the other, as if to celebrate the settling of their differences occurred on the evening of March 25, 1905, and on the following evening, having apparently enjoyed his first potation, he was given another by the same person. Following this second potation his memory became a blank, and it was not until April 6 that he recovered his senses and found himself a patient in the asylum From his friends and others we ascer tained that on March 27 he developed an attack of acute mania, and was dismissed from the service of his employer, who, however sent hun to his home at Jhelum in charge of another servent. At Lahore apparently he became obstreperous, his friends deserted him, and, being found dis turbing the peace, he was taken in charge by the police and brought here On admission he was in a state of acute mania he was noisy, exalted, and destructive On being asked his name he shouted it deliberately, emphasizing each syllable at pitch of his voice, repeating it several times His face was flushed and his conjunctive were congested. He tore his clothes and preferred to remain niked-covering himself with dust an l filth. After about five days he begun to recover, and rapidly regained his normal healthy condition. He gave a coherent account which was afterwards fully verified of the occurrences preceding his attack. He remained in the asylum in a perfectly sane condition, being a great help to the institution as a hospital attendant for three months when he was discharged to the care of his friend. —C J R Milne, 1906

Case -- Mania transitoria following charas amoking -- N G a Hindu, aged 30 a criminal lunatic, was admitted into the asylum on November 26, 1900 being confined under # 471 Criminal Procedure Code On February 21 1900 this man killed an old woman by beating her on the head with a stick and remained sitting by the body after the deed. No apparent motive for the murder could be ascertained Evidence was given to show that the patient's father had been insane, and the patient had on previous occasions exhibited signs of insanity He was therefore acquitted on the ground of insanity and confined in the asylum under the section quoted No history of indulgence in drugs was forthcoming at the trial When admitted he seemed and drugs was forthcoming at the 1771 When admitted no obtained dull and stupid and his memory was apparently defective Other wise he appeared to be quite same. Eventually it is recorded in his case that the man is an unprincipled scheming lar. He was recloned as same until July 1905. On the 14th of that month he was found in his cubicle smoking charas being then in a dazed condition a quantity of charas was also found in his room. He had, as was discovered, obtained this charas from the private servant of another patient a sirdar of good family Following this bout of charas smoking he became acutely manuacal being violent, noisy and destructive. He remained thus for nearly three weeks and then gradually recovered. He is quite some at present, works well, but is an expert in the art of mendacits -C J R. Milne, 1906

Gaz — A thrd recurrence of the drug habit followed by imperfect recovery—In Vajor Ewen's sense this is No 66 and the case is also noted in the text of his article. His two previous admissions are there recorded and also his own concise history of his drug taking habits. From April 1903 until Varch, 1900, he was known to have not again resorted to bhamp, and to have followed his trade in the city here On April 21, 1909, he was admitted in a state of furnous manna. He was extremely restless very nossy, shouting and singing constantly the choicectof tables. In his destroy deal line clothes, he dug with his fingers

have holes in his cell into which he could disappear lodily, and he is not a small man. he attempted to extract the bricks from the rarbition walls of his cubicle, and this too with a horrible cangrenous finger, which eventually dropped off, and which could not be dropped but must treated by the patient with smearings of filth. He was also extremely filthy with With varying acuteness this state lasted for about four weeks, when he began to recover, allowing the stump of his figger to be dressed, and becoming generally cleaner in his habits. In June he had without discoverable cause, another attack of acute manua lasting about four days Improvement followed this, but it has pover been perfect, and his previous condition has not yet, ten months after his attack, been Although he can talk sensibly to a certain degree, he is in a state of foolish exaltation constantly making unreasonable requests, asking for hieveles, etc. His memory is very defective and his speech childish He has become very fond, when he gets the opportunity, of attiring himself in a fantastic manner, being particularly keen on pages of crotesque design —C J R Milne, 1906

Case - Chronic mania following prolonged indulgence in bhang and charge - H N L. aged 80, a Brahmin employed in the Radway Mad bervice was admitted on April 11, 1905 He gave a history of having drunk a nice worth of blang dady for eight years along with others, and also of having smoked charas intermittantly for two years. His motive was to make himself more fit for his work. His memory was when he was admitted, less affected than these cases usually are, and by interrogation a coherent account of his past life was obtained from him. which was subsequently corroborated by his father and friends father stated that the son had become mentally altered four months prior to admission, and that, having threatened his wife and mother in law, they left him He was also found at the Lahore ctution in a state of mania, and was brought to the asylum. On admission on was in a state of great evaluation and excitement, and was evidently well pleased with hunself. He talked in a loud sonorous voice, bursting out at the end of every sentence into a fit of exaggemented laughter, which listed for a minute or more. He exhibited delusions of wealth and position. He has remained in this condition for about ten months, being at times more communicative than at others, but being easily groused into a foolish declamation of his powers, interpolated with much amusing lighter He is extremely proud and is solitary in his habits. His physical health remains good but he is mentally deteriorating -C J R Milne, 1906

### 2. Partial Intellectual, or Monomania.

#### DELUSIONAL INSANITA

The leading character of this form of insanity, which is now generally known as debusional insanity, may be stated to be the affection of ideation as regards one particular only. Hence there is either only one delusion, or, in more developed cases, as cares of delusions, connected together by one morbid idea (see Case (b), below). The delusion may be of the most indiculous character, the individual may believe himself to be inade of class, or to be dead, or to be some celebrated character.

melancholic form of monomana the delusion or delusions are frequently of a religious character (religious monomana), or, as in *Uass* (b), delusions of persecution (monomana of persecution) Such delusions may lead to the commission of homicide (see *Cass* (c) and (d)), or to suicide Monomaniaes, in fact, may, under the influence of their delusions, exhibit propensities similar to those exhibited, without delusion, in the various forms of partial moral mania

In markedly distinct cases of monomania, the individual appears to be perfectly some on all points unconnected with his delusion or delusions and only betray excitement or depression when these are touched upon In such cases (especially in nonmelancholic cases) the individual may appear to reason correctly and accurately on matters unconnected with his delusions, and even in matters connected with them his reasoning may be accurate, although his conclusions, being founded on false premises, are erroneous Sometimes in these cases, particularly if the individual has any powerful motive for concealing his delusion, there may be great difficulty in detecting its existence (see Cases (e) and (f)) In other cases, specially advanced cases, the reasoning powers appear generally affected so that it becomes difficult to decide whether the case is one of partial, or one of general ideational insanity Monomaniacs are often readily imposed upon and controlled by a person affecting to believe in their delusions (see Cases (f) and (g))

Gase (a)—Delunonal manuty.—Persecution 1y telephones —M I. G., Bengui hayastha agod 49 on admission in 1894 a resident of Calentia was formerly head cleri to the Inspector of Schools at the Tresidency Had a lawsuit with a disturt cousin, P N, which he lost since which time 1890 he has been meane exhibiting marked delusions that P N and his friends were constantly persecuting him with electric shocks, transmitted by telephones In 1891 he attacked P N with an axe, and was consequently sent to the asylium, where he has spent nearly fourteen years without the slightest mental alteration. All his troubles are due to P N and his telephones Quite recently he was unable to walk because of this persecution and had to be moved about —C J R Milne, 1908

Case (b) — Monomana of persecution, multiple delusions connected with one morbid idea — I female patient was "perficilly convinced of the existence of a persecuting fellow in a room above her own, who vented all his maligrity upon her by means of certain machinery and wires He 'brays' her in the night with three of these wires, so that she is stiff in the morning, and covered with marks as if she had been switched or

At other times he will thrust three wires anto her mouth, which leave "a very bitter verdigns faste therein. She protests that she can see a 'hole like the cut of kinife' in one corner of the ceiling, through which he introduces the wires. She has stopped her clock and covered it up, because he used to employ his wires to make it strike some twenty times in the night, in order to disturb her. He also, she believes. delights in sending her to sleep with chloroform, which she feels dropping from the ceiling upon her can -Bucknill and Tuke, p. 219

Case (c) -Religious monomania. - Homicide. - " A woman consulted a medical man as to pains in her head, loss of appetite, and low spirits after her delivery she was also suffering from religious despondency While in this state she not up in the night and drowned four of her children in a cistern She give this account of the act she washed the children but them to bad, and retired herself, about 10 o'clock, but could not sleen and between 12 and 1 o clock it was suggested to her mind as she says, by a black shadow; figure, that if they were in heaven they would be out of dinger and better done to than she could do for them It was still further suggested to her mind in the same way that she could esalt put them into the distern, and she at once proceeded to do so, it was better for them to die young than to grow up wicked '-Reg v Walson, Lincoln Sum Ass., 1864, Taylor, Med Jur., II p 554

Case (1) - Monomania of persecution - Homicide - " A young man who had previously had a few engleptic fits, became extremely melancholic Being possessed with the idea that he was to be murdered in his father a house he made frequent attempts to escape from it. His father was a butcher, and the soung man becoming calmer after a time, and being thought trustworthy, was permitted at his own request to be present at the slaughter of an ox, but when all was finished, he did not wish to return home His friends, however, pressed him, and two of them taking him by the arm in a friendly manner, accommanded him towards his home. but just as he approached the door of his house he suddenly drew out a butcher a knife, which he had concealed, and stabled to the heart one of them, fleeing impleduately to the forest where he passed the night. Next morning he went to the house of a relative who lived some distance off, and said that he had run away from home, as they wished to kill him there - Middslev & Phys and Path of Hand, p 371

Case (c)-Monomania of persecution detected with difficulty-"Dr t are (1 - numeromans of persecution detected with difficulty - 10 t. Th. how was requested to see a gentleman, shoes frends were desirons f placing him under restraint being well assured of his insanity from the supervention of uncontrollable outbreaks of temper, to which he had been previously given way though they could find no ostensible group f in his conversation or actions which would legally justify the use of coercive measures beveral medical men had been consulted. alle whom had failed to obtain any such justification . Dr Thomson, strick with the cudence of violent passion, afforded by the damages do fe to the furniture of this gentleman's apartments, 'felt convinced th it there was some perversion of feelings or intellect which it was his business to discover I or two hours he conversed with his patient on a variety of topics, and never enjoyed a more agreeable or instructive convergetion, his patient being evidently a man of great attainments Dr Thomson was beginning to despair of finding out the mistery of his disorder, when it chanced that animal magnetism was adverted to, on which the patient began to speak of an influence which some of his relatives had acquired over him by this agency, described in the most vehement language the suffering he endured through these means, and Nower vengeance against his persecutors with such terrible excitement, that it was obviously necessary alike for their security and his own without the should be placed under restraint."—Carpenter's Menial I hymo 199, p 609

Circ. V).—Monomania, the delusion only discoverable with difficulty.—Vpc200, who had been confined in a limatic asylum, presecuted his

brother and the keeper of the asylum for false imprisonment and duress. Erskine was informed that the man was undoubtedly insanc, but was not told the particular form which the malady assumed. The prosecutor. himself a witness in support of the indictment, was put into the witness-box and examined; and when Erskine came to cross-examine him, he found his evidence clear, distinct, collected, and rational. He tried to discover some alienation of mind: but during a cross-examination, conducted with all the skill and sugacity of which he was master, for nearly an hour he was completely foiled; the answers were perfectly rational—there was not the slightest sign of mental alienation. A gentleman, however, who had been accidentally detained, came into court, and whispered in Erskine's ear that the witness thought he was the Saviour of mankind. On receiving the hint, Erskine made a low bow to the witness, addressed him in terms of great reverence, and respectfully begged to apologize for the unceremonious manner in which he had treated a person of his sacred character, and called him by the name of Christ. The man immediately said, 'Thou has spoken truly; I am the Christ.' "-Case related by Erskine during his defence of Hadfield, Browne, Med. Jurisp. of Insanity, p. 290.

Case (q) .- Monomania readily controlled .- "Henry Weber, Sir Walter

Scott's private secretary, became addicted to habits of intoxication, which injured his health. One evening, Scott, after Weber's return from Edinburgh, observed Weber's eye fixed upon hun with unusual solemnity of expression. On inquiring after his health, Weber rose and said, 'Mr. Scott, you have long insulted me, and I can bear it no longer. I have brought a pair of pistols with me, and must insist on your taking one instantly, and with that he produced the weapons and laid one of them on Scott's manuscript. 'You are mistaken. I think,' said Scott, 'in your way of setting about this affair; but no matter. It can, however, be no part of your object to annoy Mrs. Scott and the children; therefore, if you please, we will put the pistols in the drawer till after dinner, and then arrange to go out like gentlemen.' Weber answered with equal coolness, 'I believe that will be better, and laid the second pistol also on the table. Scott locked them both up in his desk, and said, 'I am glad you feel the propriety of what I suggested; let me only request further that nothing may occur while we are at dinner to give my wife any suspicion of what has been passing. Weber again assented, and Scott withdrew to his dressing-room, despatched a message to one of Weber's intimate companions, and had the manuac secured and placed in confinement."-Guy's For. Med., p. 188.

Somnambulism, or 'sleep walking,' is allied to epilepsy and the artificially produced state of mesmerism or hypnotism (see p. 377). In this condition the higher or intellectual nervo-centres appear to be in a state of partial activity only, or, as in the higher form of somnambulism, in a state of full activity to one train of impressions, but inactive as regards others. In this condition, while bent in accomplishing one object, very elaborate acts may be performed, and dangerous ground traversed heed-lessly which would disconcert the mithed when wide awake. Hence the mere fact of the performance of such an act does not of itself indicate that the higher or intellectual nervo-centres were in full activity at the time of its performance. This is

obviously of much medico-legal importance, seeing that such acts, done during a condition of partial activity only, of these higher centres, may result in the death or injury of others, and form the subject of a criminal induiry

If somnambulism be proved, the accused is exonerated from responsibility for any criminal act, and this is also the case if

the person be suddenly roused from a deep sleep

Case—Someambahat acquited of murder—"In 1878 a man named Traver, in Gispow, was trace for the murder of his child by beating it agunata wall. He was acquitted on the ground of being unconscious of the nature of his set by reason of someambalism. He was agroup from an epilepto and insune stock, his mother died in an epilepto and insune stock, his mother died in an epilepto and some of his relatives were name "—Husband a F  $W_{\rm sp}$ , 7122

Case -Somnambulism .- "A butcher's boy, about sixteen years old, apparently in perfect health, after dozing a few minutes in his chair. suddenly started up, and began to employ hunself about his usual avoca tions. He had saddled and mounted his horse, and it was with the greatest difficulty that those around him could remove him from the saddle and curry him within doors. While he was held in the chair by force, he con timued violently the actions of kicking, whipping, and spuring. His observations regarding orders from his master a customers, the payment at the tumpike gate, etc., were seemingly rational. The eyes, when opened, were perfectly sensible to light. It appears that flagellation even had no effect in restoring the patient to a proper sense of his condition The pulse in this case was 180 full and bard. On the abstraction of thirty ounces of blood, it sank to eighty, and disphoresis ensued After labour ing under this frenzy for the space of an hour he became sensible, was axiomshed at what he was told had happened and stated that he recollected nothing subsequent to his having fetched some water, and moved from one chair to another which indeed he had done immediately before his delirium came on. - Browne's and Jur of Insanity, p 237.

Case—Stabbusg performed during sleep—""Two persons sho had been hunting during the day slept together at might. One of them was renewing the chase in his dream, and imagining himself present at the death of the stag, ered out 'I li kall him? I lik lih him? The other, awakened by the noise got out of hell and by the light of tho moon beheld the skeper give several deadly staks with a kinde on that part of the bed which be had pust quitted "—Taglors Med Jur. 20.d et, II p. 600

Gase—A man stabbed by he brother under similar accountances—" A Spanaral et whenly six, who had been a soliter, always of good coulout, and in tolerable health, was subject every spring to epistans, also to taiking in his sleep. The spring of 1853 passed without epistans and from this time particularly during the night he was subject to certain moral, distributions, for, which pupping, was advassed. Desabling with a brother, and sleeping in the same bed he was attacked during the night pit the excitement. Januel that his beliefflow was going to hill him, and securing a kinds he plunged it into his neck. He then went out and sleep on the statement framed that his bediefflow was going to hill him, and securing a kinds he plunged it into his neck. He then went out and sleep on the statement from both the size of t

Case.—A man auddenly aroused from sleep stabs another.—"A Pedlar, who was in the habit of walking about the country armed with a sword stick, was awakened one ovening, while lying a leep on the high road, by a man suddenly seizing him and shaking him by the aboulders. The man, who was walking thy with some companions, had done this out of a joke. The pedlar suddenly awoke, drew his sword, and stabbed the man, who soon afterwards duel He was truel for manislaugher, and, although his irresponsibility was strongly urged by his counsel, was convicted."—Hb, p. 241.

Gas.—Higher form of somnambulum.—"An emment Scottish lawyer had been consulted about a case of great difficulty and importance, and had been studying it closely and anxiously for several days. One might is wife saw him rise from his bed and or to a writing desk which stored in his bedroom. He then sat down and wrote a long paper, which he carefully put by m his desk and returned to bed. The following morning he told his wife that he had a most interesting dream, that he had dreamt of delivering a clear luminous opinion respecting a case which had exceedingly perplexed him, and that he would give anything to recover the time of thought which had passed before him in his dream She then directed him to his writing desk, where he found the opinion clearly and fully written out. "Carpenter's Meritad Phys., p. 603.

Case.—Higher form of somnambulism—"A banking house once give to a Dutch professor of mathematics (Professor Van Swinden, of Amsterdam) a question to solve which required a long and difficult calculation. He first true it in meed is everal times but never without mixtake, so he handed it over to ten of his pupils. One of these attacked the problem with great vigour, but more than once without success. Late in the night which preceded the day fixed for the giving in of the answers, he went to bed baffled and tired. But in the morning, most strange to relate, he finds a paper on his desk, in his own handwriting, on which the problem is solved, without a single blunder. He had calculated the problem is solved, without a single blunder. He had calculated the problem in his sleep, and in the dark. It was singularly clear and concised, and the professor binned fledered that he had never thought of a solution so simple and concise "—Gny's Factors of Uniound Mind, p. 71.

Hypnotism or mesmerism is an artificially produced state which is allied to somnambulism. It is now of medico-legal interest chiefly with reference to rape (p. 301) or testamentary cases. The hypnotism tranco may be induced by administering a dose of formaldehyde, and then waving a candle before the eyes of the person seated in a chair, with the head resting on a high pillow.

Before the introduction of chloroform it was largely used by Dr. J. Esdaile, I.M.S., in Calcutta, as an ancesthetic for painless operations On the 4th April, 1845, he had to perform an operation on a Hindu prisoner at Hooghly, and he tried the 'mesmeric passes' he had read about, and to his delight the patient passed into a state of deep sleep That there was "a complete suspension of sensibility to external impressions of the most painful kind" was vouched for by the collector and the judge of Hooghly. Esdaile wrote an account

of this and other cases in the now extinct Indian Journal of Midwal and Physical Science (May, 1845) The medical press declared that Esdaile was duped, but when he had collected 100 cases he reported the matter to the Govern ment of Bengal, who appointed a committee of four medical men to report on the matter The committee carefully investigated nine operations performed under this influence by Esdaile, and reported very favourably upon it recommending that assistance should be given to Esdaile to continue his investigations. A small hospital was set apart for him in Calcutta in November, 1846, and after a year's experience the medical visitors appointed by Government, reported that "complete incensibility to pain was produced by mesmerism in the most severe operations ' The new Governor General, the orent Dalhousie, ever a friend of the medical profession in India, congratulated I sdaile and appointed him to be a Presidency Surgeon But already, in 1848, the use of chloro form had begun in India and though Esdaile continued to work with mesmerism, there can be little doubt that chloroform killed off mesmerism as an anasthetic agent. Esdule retired from the service in June 1851, after twenty years' service. He left a record of 261 punless operations done by him under mesmerism including many elephanticsis tumours, one weighing 105 lbs, which other surgeons had declined to touch 1

## 3 General Moral Mania.

Moral or affective muna (manu smeddin 10) is distinguished from intellectual or ideational mans by the absence of delivous, although lawyers find it hard to accept the view that insanity is possible without delision. It may best be defined, in the words of Ogston 2 is 'consisting in a morbid perversion of the natural feelings, affections, inclinations, temper, labits, moral disposations, and intural impairse, without any remarkable disorder of the intellect or knowing and reasoning faculties." In general moral mans at his morbid perversion is general, and, as a consequence, the individual exhibits several depanded propensities. He is on the borderland between habitual vice and insanity. The three undernoted cases are examples of this form of mans.

Case —General moral mania. — "W R ort 27, I ad been eight times the House of Correction. His father was an epileptic and be himself had been subject to convulsions when teething and at intervals during

<sup>&</sup>lt;sup>2</sup> Dr Crawford in Ind Mel Gas, 1901, p 465. <sup>2</sup> Lect, Med Jur, p 304

his after life He tortured animals, picked out the eyes of a kitten with a fork He hed and stole He was expelled from school as too bad to be kept. He afterwards consorted with the worst characters, was drunken, debauched, dishonest. He attempted or pretended to commit He was utterly false and untrustworthy He delighted in torturing those patients who were, like himself, confined in the lunatic asylum, and who were too weak to resent injury with violence indelicate in the presence of females and attempted a rape on his mother and on his sister Yet with all he was intelligent, exceedingly curning, and, while actually the victim of epileptic seizures, he was prone to feigh fits, and did it with considerable ability. In spite of careful watching, he repeatedly effected his escape, was exceedingly vain, and in the presence of some persons seemed to be exceedingly devout ingenious in excusing his errors, and, although exceedingly mischievous, was careful to avoid disagreeable consequences This individual. Browne further remarks was possessed of 'an intelligence of such high order as to enable him thoroughly to understand the relation between a found out crime and its punishment, for he invariably tried to conceal the commission of the criminal act by lies, hypocrisy, and various clever explanations "-Browne s Med Jur of Insanity p 114

Case -- General moral mania.- "An old man, aged 69, who had been in one asylum or another for the last fifteen years of his life. He had great intellectual power, could compose well, write tolerable poetry with much fluency, and was an excellent keeper of accounts There was no delusion of any kind, and yet he was the most hopeless and trying of mortals to deal with Morally he was utterly depraved he would steal and hide whatever he could, and several times made his escape from the asylum with marvellous ingenuity. He then pawned what he had stolen, begged, and hed with such plausibility that he deceived many people, until he finally got into the hands of the police, or was discovered in a most wretched state in the company of the lowest mortals in the lowest part of the town In the earlier part of his insane career, which began when he was 48 years old, he was several tunes in prison for stealing In the asylum he was a most troublesome patient, he could make excellent suggestions and write out admirable rules for its management and was very acute in detecting any negligence or abuse on the part of the atten dants when they displeased him, but he was always on the watch to evade the regulations of the house, and when detected, he was most abusive, foul, and blasphemous in his language. He was something of an artist, and delighted to draw abominable pictures of naked men and women and to exhibit them to those patients who were addicted to self abuse He could not be trusted with female patients, for he would attempt to take indecent liberties with the most demented creatures. In short, he had no moral sense whatever, while all the fault that could be found with his very acute intellect was that it was entirely engaged in the service of his depravity of his depravity At long intervals, sometimes of two years, this patient became profoundly melancholic for two or three months, refused to take food, and was as plainly insane as any patient in the asylum. It was in an attack of this sort also that his disease first commenced -Maudsley s Phys and Path of Mind, p 362.

Guse—General moral manus.—Nucousness and depravity —V B, age about 22, admitted 16th August, 1899, into Labore Asylum, is an habitual criminal who has apparently never in his life maintained himself by honest labour. While in jail for a term of imprisomment for receiving stolen property, be was found so constantly troublesome and

given to making unprovoked assaults on the weaker prisoners, being filthy, and utterly unamenable to reason and punishment, that he was finally certified as a lunsite and sent here. Absolutely no previous or

family history is obtainable of a reliable nature Beyond a certain amount of irritability he showed no sign of insanity, but he was soon found to be vicious, cruel and animal, disobedient and revengeful, tearing up his bedding if checked and destroying the materials of his work if spoken to. It was considered that his conduct denoted him at that time to be more of a criminal than a lunatic, and he was discharged at the expiration of his sentence in December, 1900, but his conduct obliging the authorities to put him upder security, he was sent back to rail, and again later on was transferred here with the same history (early in 1901), and since then his conduct has never varied. He is a tall, well built young man of most repellent aspect, being thick lipped, with one ear cropped, and his face plentifully scarred as a result of old lights and injuries He is clean, tidy, without any of the usual signs of insanity that is to say he speaks sensibly intelligently, and coherently, is without delusion or hallucinations, and works well and skilfully with application when it so pleases him. He sleeps and eats well is not an epileptic and is in good physical health. But he is, on the other hand most vicious unmoral and unprincipled a fluent har, a thief, and though a coward constantly found committing assaults on the weak and helpless lunatics, it is said that he assisted another patient to kick a man to death he is perpetually endeavouring to commit sodomy always ill treating and bullying the weak dements and idiots, and daily concerned in some quarrel or gritvance which the others come to complain about mischievous disobedient absolutely unreliable and uncontrollable, the perfect pest of the whole asylum on whom no training,

no kindness persuasion or threats have the slightest permanent influence. Now this man's actions have all the appearance of pure viciousness; he has perfect memory, he lies to excuse himself or for some other end, he does not steal from a magne love of collection but with a definite end and purpose he is grossly immoral and his acts of assault and cruelty are always on those weaker than himself and not done out of pure insane impulse or m ungovernable passion. It is doubtful how much they are due to the failure of volition, for when caught and threatened with the deprivation of some privilege or the imposition of a punishment he will remain for some days quietly and orderly, but the effect gradually wears off, and he again follows his old evil courses. In his case his general intelligence is of such a high order as to preclude the possibility of suggesting his act as due to imbecility or weak mindedness. It may be also pointed out that being so intelligent it is reasonable to suppose that he would exercise more self control to escape from his present uncomfort able position, and his failure to do so is a very strong evidence of his insanity He is certainly irresponsible and incapable of seeing things as others do and his general conduct for ordinary public security and comfort renders it imperative that he should remain seeluded either in fail or a lunatic asylum, even though his history may always give different observers opportunities for debuting as to which particular institution he more properly belongs -G T W I wens, Ind Med. Gas., 1902, p 230

Impulsive insanity.—Those persons who act criminally on impulse even when their action has the aspect of premeditation, may jet be entitled to plead partial irresponsibility. The antocedents of this state of mind must be investigated, for the changed self which eventuates in the criminal explosive act is not necessarily of rapid growth Although the act is, as such acts are, sudden and explosive, yet it is only the terminal of a process which may have been going on for some time, and therefore it is not only the act itself which has to be considered, but the whole process of which it is a part, and the impairment of the mental condition may be traced to environment or a combination of circumstances forming a new and narrowed self, incapable of deliberation and dangerously explosive on the slightest provocation, whilst there seems reason to believe that many of the explosive acts of a homiedal as well as suitedal character are attended with an imperfectly conscious and relatively mechanical condition?

### 4 Partial Moral Mania.

This form of manua only differs from the preceding variety in the fact that the morbid perversion is not general but limited to one or two particulars. Hence, in partial moral mania, the individual exhibits one or two, instead of severil, morbid propensities. Under this form of mania may be classed the impulsive or explosive in-anity of some writers. Different varieties of partial moral mania are distinguished according to the special propensity present, for example, homicidal mania, suicidal mania, kleptomania, pyromania, etc. Medico-legally the more important kinds are the following—

## Homicidal Mania.

Homicide, as has been already pointed out in Cases (d) and (e), p 374, may be the result of Addingon, such as the belief that the victim is persecuting the accused. Such cases, according to Bay's classification of munit, belong to intellectual insantly, is usually to the partial form, and may, therefore, be called cases of homicide, or attempt at homicide, appears to be the result of an insane propensity or 'impulse,' unaccompanied, at least so far as can be ascertained, by a delusion, and so would be classed as moral or effective maina, usually of the partial variety, and to these the town 'homicide's manis' is commonly applied Murder may also be committed by insane melancholics in the belief that they are saving the person from some danger, etc. by women suffering from purperal insanity (here the victim is usually their infant) or in the frenzy of an epileptic seizure

Case—Homicidal mania, gradual approach—"A young man, at 25, and of gentlemanly appearance, after giving his address, and declaring himself to be a schoolmaster in a certain well known college

T Claye Shaw, MD, Trans Med Leg Soc, 1903, I 31

im Paris), begged that the Commissary of Police would take him in charge with a view to his confinement in the Asylum of St Ann He then explained that he was not mad in every respect, on the contrary, he possessed the full use of his mind, only while eleeping among the pupils confided to his charge, he was seized with the most destructive inclinations hight after night in an agony of fear he had struggled with himself, and it was with the greatest difficulty that so far he had succeeded in restraining his intense desire to strangle one or two of the httle boys Now all his energies were exhausted He felt that this unknown power would ultimately triumph over hun and rather than commit the crime he placed himself in the hands of the police. At this moment a boy accused of their was brought into the room. The eyes of the schoolmaster were immediately hit with a strange light, and had it not been for the timely assistance of a brawn, policeman, the boy would have been throttled before the eyes of justice '-Bucknill and Tuke, p 268

The proportion of criminal to civil instance is enormously greater in India than in England Whereas in the former, it is one to three, in the latter it is one to one hundred and thirty One of the reasons for this unenviable state of affairs is that in India a great many dangerous insanes are permitted to freely wander about or are allowed to be kept by their friends, with the result that they are only consumed to asvlums when apprehended by the police for some breach of the law, most commonly an act of homicidal violence It is noteworthy that a very large percentage of the criminal insanes in Indian asylums should have actually committed murders. In the Punjab Asylum on March 31, 1906, out of 121 criminal insanes 81, or 77 per cent, had killed their fellow-men, while of 351 male criminal insanes treated in the Berhampore Asylum in 1907, 132 were murderers, 9 had attempted murder, 43 had performed acts of guevous hurt with more or less homicidal intent. one had attempted murder as well as suicide, while only ten had attempted suicide. The small number of suicides is not to be surprised at, for the common methods of suicide in this country, viz poisoning or drowning, are generally successful Of the ten would-be suicides in Berhampore, five of them had attempted to cut their throats, and had been saved by prompt The total number of cruminal insanes in Berhamnore is absurdly large, and is due to the inclusion of a number of perfectly harmless village fools and idiots who have been charged with trivial crimes, such as travelling without railway tickets, petty thefts, house trespiss, and even begging the 351 criminal missines treated at Berhampore in 1907, only 216 would fall into this category in England Steps are being taken to transfer the harmless criminal insanes to the civil divisions of asylums, and instructions are being issued to magisterial officers regarding the disposal of harmless insane persons charged with minor offences.

Gaze—Epileptic insanty, with marked suicidal and homicidal im pulse—Gajabur Lambin, a Nepali, admitted from Dargeding in 1901, at the age of 28 He had previously served in the Burran Military Police and had been discharged on second of epilepsy. One day, in 1900, at Dargeding, he suddenly ran 'amok', killing his cousin, several goats, and fowls with a kukir before he was secured. Since admission he has suffered from epilepsy, the servires occurring at long intervals. He is unusually allent prior to a fit, and is extremely previously and dangerously excited after one. At all times he is a man hable to attack suddenly, without motive or provocation, any one who may be near lime. He requires to be constantly watched. During 1901 and 1902, after admission, he was more suicidally than homicidally inclined, and he made three determined attempts to end his life. On beptember 26, 1901, he cut his throat with a piece of tin partially severing the trackes. On January 16, 1902, he attempted to wound his neck with a pointed bamboo, and on the 19th of May following be tried to strangle himself. Since then, however, the tendency to self-destruction has been less prominent.

Case — Chronic manus with homizedal impulse — Gopi Bhuia, a Hinddi (Knabrta) from Midnapore, admitted on February 24, 1902, having been indicted for murder but unable to stand his tral on account of his minantly. He is said to have been regarded as weak minded from infancy, and to have some years prior to admission become addicted for ganps smoking which made him thoroughly imsane. He has continued since admission in a state of restless noisy excitement. His speech and his intelligence is that of a child. He is extremely liable to make sudden aggressive attacks and has frequently done so. On December 80, 1902, he rushed up to and killed an unfortunate fellow patient before he could be restrained. He is the most dangerous insane in the asylum and his treatment is a matter of very great difficulty.—C. J. R. Milne, 1908.

In some cases the insane propensity appears to be of gradual growth (see Case, p. 358), in others, previous to the commission of the act, the individual shows symptoms (perhaps only slight symptoms) of the existence of eccentricities (see Cases, pp 371 and 379), mental disorder (see Case, p 383), and it has been noticed that homicidal tendencies may coexist with a quiet exterior In other cases, again, the homicidal act appears to be the result of a sudden and uncontrollable impulse, occurring in an apparently sane person the commission of the act being, as it were, the only symptom of insanity exhibited, as in cases of running amok Not infrequently the homicidal propensity of impulse appears to be connected with disordered menstruation, or with parturition, puerperal fever or with Not infrequently, also, it is accompanied by suicidal Especially in cases where the symptoms of msamity are slight, importance attaches to the character of the act

Running amok.—The word amok is a Malay word meaning, literally, 'frenzied' But it is applied to the impulsive form of

reckless multiple homicale often without motive is usually associated with the delirious intoxication of Indian hemp and is most prevalent amongst Mohammedans. In the Malay Archipelago it appears to occur independently of drug intoxication Dr Gimlette 1 considers the Malayan form to be pathological and allied to comnambulism the individual being rendered 'subconscious by the unrestrained action of his own automatic centres' and in some respects allied to the 'procursive' form of epilepsy in which the patient starts to run. There is always says he (1) sudden paroxysmal homicide, generally in the male with evident loss of self control, (2) it is preceded by a puriod of mental depression. (3) there is a fixed ides to persist in reckless killing due to an irresistible impulse of a purposive character, (4) there is a subsequent loss of memory Another Malay observer 2 divided amol into two classes. (1) cases where the motive is revenue for a supposed or real wrong where the assulant becomes perfectly reckless, and (2) what he describes as orang beramol which requires the intervention of the medical jurist to prevent irresponsible persons suffering from the penalty of the law As the first persons injured are sometimes strangers with whom the accused is not at enuity, and whom he could have no motive in killing the mental condition of the amok murderer should be subjected to prolonged medical observation with reference to the question of responsibility

Case -- Homic dal man a by cutting -- This man an inmate of Labor. Asylum has for fourteen years I cen constantly possessed with the desire to kill by cutting Ao family history of any kin lasavailable of a reliable nature At the age of 32 there is a do obtful history of his having been for three months strange and alterel given to enrang God and the I rothet with delusions of excitations saving that he himself was a prophet Following this it was not or I that he ha I become more irrital le an I quarrels me but this disappeared, an I he was thought to be perfectly same and normal. He is a barber a friend of the finally used to come. daily to sit in his sloy, and armed as usual on the 3rd July 1887 when quetly without any warning or provocation our patient came up behind him and cut his throat with his razor Since that time up to 1900 when he was transferred here hel ad been confined in juil as a criminal lunatic He is and always has been a quiet well behaved man speaking calmly and sensibly without the slightest of the usual signs of insanity clean decent intelligent without delusions or hallucinations, although a fluent har and a very plausible speaker but he is, notwith-tan lin, always trying to secrete knives or sharp pieces of tin and with these make a murderous attack on some one his own desire which le seems quite unable to combat beng to kill by cutting some fellow creature. In Tune 1900 he somehow manage I to get possession of a razor and without provocation made a inurderous attack on a fellow prisoner On 80th

Med. trchives Federated Malay States 1901

<sup>\*</sup> Dr Oxley in 1943 quoted by Chevers

October 1901, he secreted a piece of iron hoop, and with this unsuccess tally attempted to cut another lumatos nose of Since then, with stringent supervision, he has failed to obtain means to effect his purpose, and has remained the same quiet, intelligent, well behaved man he has always been for the last fourteen years —G. I'W Ewens, Ind Med Gaz, 1902, p 239

The chief points usually stated to indicate homicide by an insane are .—

- (a) The absence of motive.—Case below is an example of this Sometimes there is not only an entire absence of motive, but, as pointed out by Taylor, the act is done "in opposition to all human motives A woman, for example, murders her own children, or a man known to be fondly attached to his wrife, kills her Caution, however, is necessary in judging from this character In a murder by a same person there may be an apparent absence of motive, simply because the motive has not been discovered On the other hand, in cases of homicide by undoubtedly insane persons, a motive—often, it is true, incommensurate with the act—has existed, or has appeared to exist. Again, in cases of homicide by same persons, especially in India the motive leading to the crime is sometimes a very trivial one.
- (b) The absence of concealment of the act Case below affords example of this On the other hand, there is sometimes a considerable effort at concealment of homicide by an insune.

Case — Homicidal mania in an individual otherwise apparently sane — "William Drown strangled a child whom he met by accident and then requested to be taken into costody. On the trial he said he had never seen the child before, and had no malice against it, and could assign no notive for the dreadful as of Ha bore an exemplary character, and had never been suspected of being insane — Guy s Factors of Unsound Mind, p. 181.

- (c) The absence of accomplices.—This character is often present in homicide by sane persons. The existence, however, of accomplices strongly indicates sanity
- (d) Numerous murders committed at the same time.— Little reliance can, however, be placed on this character. In homicide by insanes there is often only a single victim (see Casco, pp. 308, 373 (c), and 383). On the other hand, in homicide by same persons, there are sometimes numerous victims, as in 'Ranning amok' (p. 383).

Absence of elaborate premeditation.—To this, however, there may be exceptions

Gase.—Homeodal manus with elaborate premeditation under 'purity' hallucination —Bertha Peterson, aged 45, daughter of the Rector of Biddenden, was indicted for the murder of John Whibley Tha deceased,

2.

a shoemaker, had been a teacher in the Sunday school of Buldenden. and there had been rumours eighteen months before the murder of his having behaved indecently towards a little girl of eleven. The prisoner was much interested in the rumour, was a disciple of Mr Stead, took a great interest in the Criminal Law Amendment Act, and amount to have allowed her attention to be absorbed by these subjects until she Lecame even more crazy than the general run of the nasts minded anostles of the purchased a revolver and practised with it. She wrote to the deceased expressing her regret for the mistaken attitude she had adopte I towards hup, and asking him to meet her in the parish schoolroom in the presence of witnesses and shake hands as a token of forgiveness The meeting took place and then asking deceased to take a good look at a picture on the wall, she placed a revolver to the back of his head and shot him dead. Evidence was given of various eccentricities in the previous conduct of the prisoner and Dr Davies superintendent of the kent County Asylum and Dr Hoare surgeon to the Maidstone Jail in which the prisoner had been detained pending her trial stated that in their opinion the prisoner was under the hallucination that she was ordered to shoot the man At this point the judge interposed and invited the jury to stop the case The jury preferred to hear the commencement of the speech for the defence, but before its conclusion they returned a verdict of guilty but insane

This case shows the exaggerated effect that any emotional propagands may have upon persons of untable brain. The unfortunate womans mind was obsessed by the pseudo revolutions of Mr. Stead a pornography, and her crune was the result of her obsession. The case with which the ples of masnity was established is mither remarkable in consideration of the claioust premediation and contrivance exhibited. This case bears a striking relation to the Prendergast trial. The evidence of premediation adoption of means to enable shown by this unfortunate limits were of the same kind as those relied upon by the prosecution to prove the santy and fall responsely that of Richard Prendergast for the murder the santy and fall responsely that of Richard Prendergast for the murder

of Carter Harrison - Jour Mental Sc October, 1809

Klentomania, or the impulse to steal, is often present in general mental disease though it is sometimes pleaded to excuse a theft by well to-do people otherwise same. In some cases theft committed by an insane is distinctly traceable to the existence of a delusion eg the individual may believe that he is only recovering property stolen from him. This sometimes occurs as an outcome of the delusions of boundless wealth often present in incipient general paralysis. Or, again, the andividual may believe that he has received a dryine command to take possession of the articles he steals. In other cases, by no means common, there is no delusion, but simply a morbid propensity or uncontrollable impulse to steal or to acquire. Kleptomania is sometimes strikingly hereditary, and it is · alleged that it has often shown itself in women labouring under disordered menstruction, or far advanced in pregnancy 2 Browne 2 goes at length into the characters which distinguish

<sup>1</sup> Backnill and Tuke op cet, p 284. 2 Marc and others, quoted by Taylor, Man p 757 2 Mc I Jur of Insantly p 182

theft by Aleptomuniaes from theft by same persons. A brief summary of these is as follows —

(1) The articles stolen are such as the merus of the individual would readily enable him to purchase (see Case (a) below) or are of little value (2) Some kleptomium es steal openly others willingly arow the act or restore the goods stolen. Some, however, conceal the theft with much ingenity (3) kleptomainaes, as a rule, make no use of the articles stolen, they either throw them awny or hoard them and have no accomplice (4) In many instances but not invariably the articles stolen are bright and glittering articles. Case (a) below in which kleptomaina wis set up as a defence to a charge of theft, illustrates the points to be attended to in forming an opinion or cases in which it is illeged this form of insantity exists.

Gase (a) —Kleptomania — Mr VI — was an individual of high rank the owner of an excellent estate and was as wealthy as most of his neighbours in the county in which he resided. He was never suspected of being instance and the only a vidence of mental unsonainess thirt could have been obtained was a confession on the part of some of his scriants that he was sometimes peculiar. Yet this gentleman was in the habit of appropriating 'towils. He invariably when viviting or on a journey packed the towels he found in his be lroom in his portmanteau. And when he returned home the stolen articles were by his own directions returned to their real on ners.—Browne op ct [p. 12].

Case (b) -Alleged kleptomania (Casper IV p 308) -Frau von V----, a lady of certain rank committed during her pregnancy their in three goldsmiths shops. She concealed her conduct from her husband until she was summoned after her delivery when she confessed to him her thefts accounting for them by stating that during her pregnancy she had been serred with an irresistible desire to possess herself of glittering objects She also said that she had gone out with the intention of returning the articles she had taken but had become convinced by the way that they were her own property properly acquired Much evidence was given which went to show the existence of mental aberration Casper, being referred to gave it as his opinion that Frau von \ was criminally responsible that in fact in her case the propensity to acquire was not irresistible and gave as reasons (1) That although the accused had besought her husband not to take her to those places where shining objects were to be seen she went to goldsmiths shops of her own accord. and without any necessity for doing so (2) That she had paid away silver (3) That she broke up the objects she stole in order that they might rate be recognized, and in that way lead to her detection (1) the had not gone to the same goldsmith a shop twice (5) She had concealed her conduct from her husband, and (6) when interrogated she had made many false and contradictory statements -Browne, Wed Jur of Insanity p 138

Incendiarism.—Cases of pyromania or morbid propensity for incendiarism, sometimes occur Loung females suffering from disordered menstruation or hysteria, or epilepsy are said to be specially hable to it

Other forms of partial moral mania are erotomonia an uncontrollable craving for excessive sexual intercourse, it is called in implomentar in females and satyrasis in male; it may exist in the eather stages of general paralysis and loco motor ataxia, and dipsomania, a morbid craving for in toxicants.

### Examination of Alleged Insanes,

To ascertain the existence or otherwise of meanity you examine -

- 1 General appearance of patient —Especially (a) my crannal deformity (see 'Amentia') (b) the facal expression and gestures—there are often highly indicative of insantis, especially of its advanced or more fully developed forms, and (c) any peculiarities of dress, gait, or surroundings.
- 2 Bodily condition,—Note specially (a) the condition of the digestive functions—these are often disordered in the early stages of insanity, the skin becoming barsh and dry, (b) the state of the pulse and the presence or absence of febrile symptoms—thus is important in distinguishing between insanity and the delirium of disease, and (c) the presence or absence of insomina, restlessness excitement, depression, or diffict of speech or articulation. Blockull and Tuke observe that in a great many cases of chronic mains the hur becomes rough and bristing. A blood timour of the car (heismatoms) ending in shrivelling the so called asylum, or 'insane ear,' is often noticed in advanced cases.
- "3 History.—(1) As indicative of the cause of the discase The envirence or absunce of (a) congenital defect, (b) herebitary taint, (c) habitud indulgence in intoxicants, (d) disorders, especially in females, of the reproductive organs, (c) epilepsy, or other brun affection or injury, (f) excessive sexual indulgence, and (g) mental overwork, anxiety, or sudden shock Inquiry should also be made as to whether supthing has eccurred likely to induce the individual to firigin usuanty. It must not be forgotten lowever, that sometimes usually may arise from the auxiety of mind resulting from a criminal charge (2) As to existence of the disease it should be noted whether or no (a) there has been any marked alteration or change in this feelings, affections, and habits of the patient, and (c) inquiry should be inde generally as to the symptoms observed at the contamencement of the alleged outbreak of insanty.

Case—Insanty due to anxiety of mind caused by a criminal charge—
A poor man a shoemaker, was requested by too police officers to assist
them in conveying to prison two men committed on a charge of their
flue shoemaker took a gum with him and on the order of the police
officers fired at one of the prisoners, who was attempting to escape, and
wounded him severely The shoemaker was committed to gool as a
criminal, and the event made "such an impression upon hun that be
became violently manuscal —Taylor, McJ. Jur. II p 469

4 Mental condition and capacity.-Inference as to this may be drawn from the patients (1) answers to questions, (2) acts, and (3) writings As regards (1), the patient's memory may first be tested He may be asked, for example, his name, place of birth, as to the occupation of his parents, number of brothers and sisters or children, the date, the names of wellknown persons, and may be asked to count in order from one upwards, etc Next, his judgment may be tested, he may be asked to perform simple arithmetical operations, may be questioned as to his knowledge of the value of money, and generally as to the inferences he would draw from particular facts While questioning him, his power of fixing his attention should be observed. Next the existence of delusions should be searched for if these are known the conversation should be led to them, if not, the conversation should be led to various topics in succession Lastly, the state of the moral feelings should be inquired into by directing the conversation to the subject of the patient's friends and relatives. This testing of the mental capacity by questions is of special importance in cases of supposed feigned insanity Except in complete amentia, advanced dementia, or possibly also in an actual paroxysm of maniacal excitement, in true insanes, consciousness, memory and reasoning power, especially as regards matters unconnected with their delusions, remain, at any rate to a certain extent, intact Case (c) p 391 is an example of feigned insanity, detected by persistently silly and erroneous answers to simple questions Care should be taken that the questions asked are not too complex, but are such as the individual under examination might reasonably, from his education and position, be expected to be able to answer

Case (a) —Mental Acuteness of "Lunatec"—Re Dunhaw. Bombay High Court, Lt Col C, I VI S, in his certificate that D was a lunatic gave as one of the "facts indicating insanity" "Although electric train cars have been running in Bombay for two years he has never tracelled in one." The alleged lunatic, smiling, whispered to his counsel who thereon asked the witness how often he, Colonel C, had been in a train car. The answer was, "Never!"

Case (b) -Ogston relates a similar case,1 for example, in which a

<sup>1</sup> Case of David Yoolow, Lect Med Jur , p 297

medical witness put forward as evidence of mental incapacity the fact that an alleged imbecile could not tell how much per cent. 420 interest on 11200 amounted to, though he himself (the witners), when asked to answer the same question, was unable to do so

During the course of the examination it should be noted whether the individual, as is usually the case with impostors, appears to be trying to make himself out to be mad. True insanes will often argue with considerable ability that they are not mad. Others are conscious of their condition. A constant putting forward, however, of evidence of insanity should always be looked on with suspicious.

(2) As to the audence of mental disorder afforded by the acts of the patient it abould be recollected that these in a true means are the results of his disordered mental condition. Where debusions exist, his acts and antics are connected with them, even although the connection may be apparently inexplicable (see Case (ai)). Sometimes as Dr. Guy remarks, 'the acts of the mannic evince the same freethought and preparation as those of the sine." (see Case (b)), and lastly, true instance are generally easily imposed upon.

Gase (a) —Acts apparently mexpheable the result of delumon.—"I expeated to be guided to prayer but a spurt guided me and placed me na
chart in a constrained position with int head turned to look at the clock,
the hand of which I saw proceeding to the fixed quarter. I understood I was
to leave the position when it came to the quarter. Another delus on I
laboured under was that I should keep my head and hereit together, and
no errer the Lord by throwing myself with precision and decision head
no errer the Lord by throwing myself with precision and decision head
notation from the Authonorush of a Religious Manuel.

Case (b) — Homicide by an insane, forethought and preparation shown—rully treated by a keeper and in recong killed him. He ellasted by a keeper and in recong killed him. He related particulars of the transaction to Dr. Hasham with great calimates and the contract of the transaction to Dr. Hasham with great relations as the latest the second of the contract of the with the production of the contract of the relation of the contract of the relation to the relation of the contract of the wide of the world have pastered for me by the courtward, thumped ine on me brevst and connued me in a dark and damp cell. Not liking this situation I was induced to play the hypornic I prelended extreme sorrow for having threatened him and by an affects how of repentance, prevailed on him to release me. For several days I paid him great attention and lent him every assurance. He seemed much pleased with the dattery, and became very firmelly in his believed to a surface of the contract of the cont

- Cane (c)—Fergreed inasmity—silly answers to questions—A widow, who had bought a bouse, and not laking it, wished to amult the contract, and fergreed insanity. When asked to count, she did so thus 1, 2, 4, 6, 8, 10, 11, 3, etc. Asked how many largers she had on each hand, she said "four" Asked how many two and two made, she said, "six" To some simple questions, such as—How many children have yon? How long has your husband been dead? What did he die of? What is your clargyman's name?—She in each case gave an incorrect answer. To other simple questions, such as—What year is this? How long is it since Christimas? Where do you live? etc., her answer was "I don't know" Asked what is the first commandment, she answered, "I am the Lord thy God" Asked what is the second she gave the same naswer, said she did not know the timel and fourth Asked the fifth, she said "Thou shalt not honour thy father and mother —Woodman and Tidy, Tor Mcd., p 900, from the Berlin Medical Zetting
- 5 Writings of the patient frequently show evidence of the existence of mental disorder by the patient. These may exhibit mecherence, or betray the existence of delusions, but eveept in cross of approaching general paralysis, the legibility of the handwriting is not usually affected. Sometimes the approach of insanity is indicated by a person omitting words from his writings or spelling hald!

## Feigned Insanity.

The chief points by which feigned insanity may be distinguished are -

- 1 Absence of characteristic facial expression.—In msannty, especially in the fully developed forms usually feigned by impostors, the facial expression is characteristic. In feigned insainty, this characteristic facial expression is usually absent, or if present, is not persistent
- 2 Absence of bodily disorder.—Bodily disorder is usually present in true, and absent in feigned mannty. The presence or absence of insomina should specially be noted. True meanes sleep but little, impostors, exhausted by their exertions in feigning mannty, sleep soundly. Deafness and dumbness are sometimes feigned. These in true insanes are usually congenital, in feigned meanes they come on suddenly, and after the occurrence of an event likely to induce the individual to feign meanity.
- 3. Sudden attack without sufficient cause.—In true manuty, if the attack is sudden inquiry will, as a rule, show a sufficient cause for the attack. Feigned insanity usually appears suddenly, without sufficient cause, and is generally traceable to a desire to escape punishment

- 4 Want of uniformity in the symptoms—In feigned institut the symptoms are use a rule not uniform with any distinct type of the true, diserse. The impostor for example mixes general minia with exertiment with advanced dementia eto. That variation from distinct type is often present in a case of true instituty, so will I owever be borne in mind.
- 5 Persistent obtrusion of the symptoms—Impostors nearly always try to c vin c you that they are mad putting forward evidence of their risking especially when they blink tle yare under observation makes little difference it closurour of a true insene

In many cases a satisfact i agnosis between ferened and true insanity can only be air l at by subjecting the priticut to prolonged observation suspected lunatics cannot be detained under observation f more than fourteen days. It must not be forgotten also t n expert witness when called upon to give an opinion a mental capacity of an indi vidual alleged to be marne t be prepared as in otler cases to state the ero inds upon v h is opinion is based

## Legal Aspects of Insanity

In the present state of r knowledge it does not appear to be possible to frame i ghly satisfactory definition of tle term insanity Ore of cl tef difficulties in the way of doing so hes in the fact the r po∘sible to set up a standard of sanity Any definiti u r example to the effect that insanity is mental imperfect of ncapacity or disorder rrising from certain causes involves the etting up of such a standard Such definitions in fact involve the necessity of our laying down a stanlard of mental perfection capacity or wanty deviation from which shall be leld to constitute it sanity is the difficulty diminished by sulf tituting for the term in samity other terms such as unsoundness of min l This difficulty of defining aberration or mental al enation the conditions however is of comparatively little importance for the reason that whenever a legal right hability or disability arrees out of the fact that an it dividual is insane it does not arise simply out of the fact of the individual's insanity but arises out of the fact that the individual by reason of his meanity is-or was at a certain specific time-mentally incapacitated to a certain extent or degree. The degree of mental incapacity which must be proved to exist in order to stal lish that such right hability or disability accrues varies with the nature of the right limbility or disability in question Hence, when in the course of an inquiry for medico legal purposes, an individual's samity or insamity comes into question, what was to be determined is not simply, is the individual insane, or was he insane, at a certain specified time? Were it

so, a definition of insanity would be necessary

What has really to be determined is—Is this individual or was this individual at a specified time, by reason of insanity, mentally incapacitated to a certain extent or degree? Such questions may arise in criminal cases, and also in civil cases Again, also the question frequently arises whether or not the insanity of the individual is of such a nature as to justify his being blaced in an asylum or under restrict

## Criminal Responsibility and the Plea of Insanity.

Every person is by law presumed to be of mental capacity sufficient to render him responsible for his acts. In criminal cuses this presumption may be rebutted by proof that, at, the time the act was done, the individual, by reason of unsoundness of mind, was mentally incapacitated to a certain defined extent or degree. The burden of proving this rests with those who assert it. The plea of insanity is often advanced dishonestly to escape from the legitimate punishment for their crime, or this plea is sometimes too easily accepted for sentimental reasons.

The verdicts passed on such occasions are 'guilty or 'not guilty but a third verdict should be allowed namely, "guilty, but insane" -Sir W. T. Gaurdner, B. Med. Assn. 1898

We have now to consider what is this degree of mental incapacity, which must be proved before an individual will be held irresponsible or entitled to an acquittal from the prescribed penalty of his crime on the ground of insanity.

The Fnglish law on this subject is to be found in the answers given in 1843, by the English judges, to certain

questions propounded to them by the House of Lords

These questions were put to the judges in consequence of the McNaughten case (see below). The object of these questions was to obtain an authoritative statement of the law for the future guidance of the courts, and the answers of the judges thereto have ever since been held to embody the law of England on the subject.

\* Case.—The McNaughten case.—In this case a man, named VcNaughten was tried for the murder of a Mr Drummond and acquitted on the ground of insanity McNaughten was under a delusion that Drummond was one of a number of persons whom he believed to be following him everywhere blasting his character, and making his life wretched. Under the influence of this deliasion he shot Drummond McNaughten had transacted business a short time before the deel, and lad shown no obvious symptoms of insunity in his ordinary discourse and conduct—Mandelse Remonstitution Martial Bussase. In

These answers are also embodied in s 84 of the Indian Penal Code which constitutes the law of India on the subject of the crimian responsibility of insanes. This section is a follows "Nothing is an offence which is done by a person who, at the time of doing it, by reason of unsoundness of mind, is incapable of knowing the nature of the act, or, that he is doing what as either wrong or contrary to law." The effect of this section may be stated to be as follows. Suppose it to be proved that an individual has done an act which were he same, would be an offence—say, for example, A has killed B Suppose, also it to be proved that A at the time of killing B was insane. A would be entitled to an acquittal if he, at the time of killing B was by reason of insanity mentally incapa citated to one or another of the following degrees.

1 To such a degree as/to render him "incapable of knowing the nature of the act?, as for example if A in killing B did so under the meane delusion that he was slaying a wild

beast or breaking a jar, or

2 To such a degree as to render him incapable of knowing that he was 'doing what is either wrong or contrity to law", as, for example, if A at the time of killing B was under the insane delusion that B was attacking him (A) for the pariosis of killing him, for in that case A s insanity would render him incapable of knowing that he was acting contrary to law, seeing that A, were his delusion true, would be justified by law in killing B

On the other hand A would not be entitled to an acquittal if all that was proved in regard to his insanity was that he killed B under the insane delusion that B had blasted his character, for in that case A, even were his delusion true, would not be; justified by law m killing B, and would be presumed, the contarry not being shown, to know the nature of his act and

also that he was acting contrary to law

Another point requiring consideration is as follows — There is a desert, expansion of union union union writers on instants, let, that one effect of insanty may be a weakening of the affected individual's power of self-control; and, that in some cases the pow of self-control is totally lost, the result boing the production of an uncontrollable impulse, is an impulse, which nothing short of me-thanical restraint will control (Case, p. 38°), to do certain acts, and 3rd, that such weakening or

total loss of the power of self control may occur, both in mannity accompanied by delusions, and in mannity unaccompanied thereby. The question therefore arises—Suppose A to have killed B, and the only thing proved about As insanity is that, by reason of insanity As power of self-control was, at the time he killed B, weakened or entirely lost, what would be the legal effect?

To this question it may be answered --

1 That any weakening short of total loss of power of selfcontrol would not entitle A to an acquittal, either under Indian

or English law

2 That, according to the Indian law, total loss of power of self control would not entitle A to an acquital except the court consider it proved that by reason of, such total loss, A at the time of doing the act was in the words of the section, "incapable of knowing the nature of the act, or that he was doing what is either wrong or contrary to law

As regards the law of England on this last point, Sir J F Stephen' states that it is doubtful whether or no an act is a crime if done under the following circumstances by a person suffering from mental disease who at the time of doing the act was by such disease totally prevented from controlling his own

conduct

Hence, in a case where the question of criminal responsibility is concerned a medical witness should not simply direct his examination towards ascertaining whether the accused is insance or not He should in addition endeavour to form an opinion as to whether by reason of insanity, the accused is mentally incapacitated to the degree specified in \$ 84 of the Penal Code He must, however, recollect that the real question at issue is the mental state of the individual at the time he committed the act Hence he must be prepared if called upon to give his opinion as to this, and, as in other cases must also be prepared to state the grounds on which his opinion is based. It may happen that in order to arrive at a correct opinion, he has to take into consideration not only (1) facts which he has himself observed, but also (2) circumstances which he has heard deposed to in evidence or of which he has been informed. It is obvious, however, that any opinion based upon circumstances not within the knowledge of the witness is worthless, unless such circumstances are admitted or proved to be true in fact, and such opinion, therefore, should be given on the hypothesis. that these circumstances really exist, and should be stated to depend on such hypothesis

Nevertheless, it should be remembered that few insane

persons are wholl, irresponsible. The insane in their routine treatment in asylums are runshed for fits of temper or committing nuisances by withdrawal of privileges such as stoppages of tobacco forbidding him the weekly dance, or the infliction of pecuatory fines. The degrees and extent of immunity to be granted to an insane for his misdeeds have been thus formulated by Dr. Hercher.—

(1) All limates should be partially immune for all their modules (2) I very fow function should be wholly immune for certain modeleds (3) Very few functions also fill be wholly immune for call modeleds—corollary—the plus of invastinj is eist-biabled did not nece sarrly involve the total minimum to fit has excess I from puss abruent it did necessarily involve I is partial immunity and (4) that in or ler to stabilish the less of insource the following mental conditions—(a) concerning delations (b) such confusion of nind that this accussed was mean the color of a preciating in their true of thoses the crumwinness under a binch the saft was committed for the color of the color

(dec --Epilepsy plea not accepted as meanity in marder --In case of H. Kerry dies Becket who incudered Vr and Vrs Cornish and their two daughters at Porest Gate in June 1919 the Lord Class Just case of Issues declined to accept til plea of insamity although the murderer was subject to fits of epileps;

Those who in a fit of intexcation by alcohol or drugs commit crime during their temporary mental aberration are not allowed the privileges of the plea of invanity

## Validity of Consent.

In certain cases the fact that an individual has given a valid consent to suffer vinta has been done to him affects the question of the criminality of the doer. But by x 90 of the Indian Penal Code a consent is invalid if given by x person who from unsoundness of mind or individuality, is unable to understind the nature and consequence of that to which he gives his consent. Hence, in certain cases the question may arise whether a consent proved or admitted to have been given, was or was not malladated by the fact that at the time of giving, it the giver was mentally incapacitated to the degree procedule in this section.

This question may arise in rupe cases, for the consent of a finale to extual intercourse may be invalid by reason of her insamity. By the law of India proof of insamity to the degree at one stated invalidates the consent. This is not so in England where a female even \( \text{\$v\$} \) so be in mane to the degree specified in s 90 of the Indian Te inl. Code may yet be capable of giving

a consent to sexual intercourse, sufficient to exculpate an accused from a charge of rape, and reduce the offence committed to a misdemeanour (see 'Rape')

The same question may arise in cases where death or hurt has been caused. By the law of India, if a person over the age of outteen suffers death or hurn from an act done to him with his valid consent, the fact that he so consented may have the effect of reducing the offence committed from murder to culpable homicide not amounting to murder; or may even, if the act be one coming under the description of s 87 of the Code, absolve the doer of the act from all cruingality.

It should also be pointed out that, by a 305 of the Indian Penal Gold, ablument of neutred of "unit person under eighteen years of age, any insane person any delarious person, any idot, or any person in a state of intorication, is punishable with death or transportation for life, while the maximum punishment awardable for abetiment of suicide of a person not coming under the above description is, by s 306, ten vears' imprison ment. The degree to which a person must be mentally meapasitated, to be an insane person within the meaning of s 805, is not defined

## Capacity of an Accused to make his Defence.

In criminal cases the question may arise Is, or is not, the accused "of unsound mind, and consequently incrpable of making his defence?" (See is 464 and 465, Criminal Procedure Code) Obviously in such cases an expert called upon to examine the accused should-gatreet his examination, not simply to the question whether the individual is or is not insane, but to the question whether or no the individual is mentally increacitated to the extent indicated in these sections.

### Competency as a Witness.

In civil cases, the law of India on this subject is embodied in s 118 of the Indian Evidence Act The 'explanation' attended to this section is as follows —

"A lunate is not incompetent to testify unless he is prevented by his lunacy from understanding the questions put to him and giving rational answers to them

<sup>1</sup> Section 300, Exception 5, of the Indian Penal Code is as follows — "Calpable homicide is not murder when the person whose death is caused being above the ago of eighteen years, suffers death or takes the risk of death with his own consent."

Section ST "Nothing which is not intended to cause death or griveous burt, and which is not known by the door to be likely to cause death or greenpaturt, is an offence by reason of any harm which it may cause or be intended by the door to cause to any person above eighteen years of age, who has given contains whether express or implied, to suffer that harm or by revison of any person who has consented to that the contains the c

The competency of a witness to testify is a matter quite distinct from the 'credibility' of his evidence. Hence it hay be that a lunatic who has been declared by the court oom petent to testify, may give evidence which the other circum stances of the case may show ought not to be believed. As in the case of testamentary capacity, no smount of discriso of the nervous system not affecting the mind renders an individual incompetent as a witness. Thus, by s 119 of the same Act.

a witness who is unable to speak my give his evidence in any other manner in which he can make it intelligible as by writing or by signs, but such farting must be written and the signs made in open court Evidence so given shall be deemed to be oral evidence.

## Testamentary Capacity.

By testamentary capacity is meant capacity to make a valid will Fo invalidate it will on the ground of the instanty of the testator it must be proved that at the time the will was made the testator was mentally incapacitated to a cirtain extent it degree may be defined to be that he either (1) did not know the nature of the set he was performing or (2) was not fally aware of its consequences, or (3) has made in disposal of his property which he would not have made his his mind been sound unifier the influence of a delisator of the mind performing its affections, or sense of right! (see cases Danker) noodfellow and Since v Since noted below).

Cisc.—Validity of the symmetric Cockburn C7 in delivering judgment in the state of the second of the second of the cockburn C7 in delivering judgment in the state of the second of the

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<sup>1</sup> Undue influence exerted on a person of feeble intellect may be held to render a will invalid although the feebleness of intellect considered per se be unsufficient to inval date it

man not having been in any way connected with him—had or could have had any influence upon him in disposing of his property. Under these circumstances, then, we see no ground for holding the will to be invalid "—Banks v Goodfellow, L R 5 Q B 549, Browne, op cit., p 101, and Maudeley, Respons in Mental Discase, p 117.

Case — Testamentsry incapacity.—In this case two wills were propounded, one made in 1859 and the other in 1867. By the first the testator left nearly the whole of his property to his wife absolutely' By the second he gave it her for her life or widowhood only, after which it was to go to the Corporation of Brighton for the purpose of forming a public library in the Royal Pavilion there. It was proved that at the time the wills were made the testator laboured under various delusions. the chief of which were that he was a son of George IV, that when he was born a large sum of money was placed in his father's hands in trust for him, and that his father had robbed him of part of this and had given it to his brothers Sir James Hannen, in summing up the case to the jury, said "You should specially bear in mind that any one who questions the validity of a will is entitled to put the person who alleges that it was made by a capable testator upon proof that he was of sound mind at the · time of the execution. The burden of proof rests upon those who set up the will, and, a fortion when it has already appeared that there was in some particular undoubtedly unsoundness of mind, that burden is considerably increased You have therefore to be satisfied, from the evidence which has been offered by those propounding the will of 1867 and the earlier will also, that the delusions under which the deceased laboured were of such a character that they could not reasonably be supposed to affect the disposition of his property. This is an extremely delicate and difficult investigation, and may be illustrated by reference to the physical world. There might be a little crack in some geological stratum of no importance in itself, and nothing more than a chink through which the water filters into the earth, but it might be shown that this flaw had a direct influence upon the volume, or colour, or chemical qualities of a stream that issued from the earth many miles away So with the mind Upon the surface all may be perfectly clear, and a man may be able to transact ordinary business or follow his professional calling, and yet there may be some idea through which, in the recesses of his mind, an influence is produced on his conduct in other matters" After pointing out that George IV had taken a great interest in the town of Brighton, and that the testator was under the delusion that his brothers, by the fraud of his father, had been put in possession of two thirds of his (the testators) property, Sir James Hannen concluded thus "It being conceded that the testator was undoubtedly of unsound mand, are you satisfied that when he made either of the wills he was capable of dealing with the subjects before hun entirely free from the delusions under which he suffered? If the evidence does not satisfy you as to this your verdict should he against the will The jury found against both wills -- Smee and Others v The Corporation of Brighton, L R 5 P D , p 84

A person who is meane therefore may make a valid will provided, at the time of making it, he was not mentally incapacitated to the degree specified above (see Case, p 398). A valid will may, of course, he made by a lunatic in. a lugid interval Obviously, however, the shorter the alleged lucid interval, the greater the caution which should be exercised in

accepting evidence of its having occurred. More ecception, will not invalidate a will, nor will any disease of the noticous system not affecting the mind. For example, a person speech less and paralyzed from apoplexy may this mind being in affected) make a valled will. A middical man, in examining mot the testimentary capacity of an individual, night ask him to repeat the principal provisions of his will, and explain their action. Ability to do so would show that the testitor understood the nature, and was aware of the consequence, of the act he was performing. The existence of delisions, etc. Jikely to affect the provisions of the will should, of course, also be innouried into

### Capacity to manage Own Affairs

When a person is alleged to be of unsound mind and incapable of managing his affairs an inquiry into the truth of this allegation may on proper application, be ordered by a court so empowered On such incapacity being proved, the individual may be deprived of the control and management of his property and a person appointed to manage it for him The courts are also empowered to make suitable provision for the protection of of the individual, eg by appointing a person to take care of him Formedy in England the usual procedure in such cases was to order an enquiry to take place before a "commission in lunes", lately, however, the proceedings have been much simplified.

ings of this nature is provided for by Act IV of 1912

In all such caves the question at issue is not simply, whether or not the individual is insine or sane, but whether or not he is mentally incapacitated to such a degree as to rended him incapable of managing his affairs. That this is so must always be borne in mind while examining alleged incanes in these cases. No general rule can be laid down as to what should in these cases be beld to constitute incapacity. Where doubt exists, it should be given in favour of sanity, it in favour of the supposition, from which, if established, disability does not

arise It may, however, be pointed out -

1 That in cases of complete amentia, advanced dementis, and general intellectual mania the individual is obviously incapacitated

2 That in partial intellectual mania an individual may be

Placed under interdiction is the technical expression.
Protection is distinct from restraint (see 'Imposition of Restraint' p 294)

incapacitated or not, according as to whether his delusion does or does not interfere with his capacity. For example, an individual may believe himself to be made of glass, and yet be perfectly competent to manage his affairs

3 That in moral mania, especially partial moral mania, the mental disorder may well be of such a nature as not to interfere

with the individual s capacity

The cases which present most difficulty are usually cases of incomplete amentia, especially the less-developed form (moral imbeculity) In such cases very great conflict of opinion often exists among the expert witnesses as to the individual mental condition and capacity This was so in the Windham case, p 360 Lastly, it may be remarked that defective memory arising from old age does not, per se, constitute incapacity. "A defective memory in an aged person, taken alone, proves nothing"1

## Validity of Contracts.

It may be sought to invalidate a contract on the ground of the insanity of one of the parties thereto. To succeed, two things must be proved namely. (1) That the insanity existed at the time the contract was entered into, and (2) that by reason of insanity the contracting party was then mentally incapacitated to a certain extent or degree, namely, that he was incipable of "understanding it, and of forming a rational judgment as to its effect upon his interests" (Indian Contracts Act [IX. of 1872], s 12).

The law of England, however, makes certain exceptions to this general rule namely (1) an insane is " hable for the price of necessaries, te goods suited to his rank and position, actually ordered and enjoyed by, and bona fide supplied to him', 2 and (2) an executed contract will not be invalidated, especially if the parties cannot altogether be restored to their original position provided the contract is a fair and reasonable one, and the other party thereto had no reason to suppose the individual to be msane at the time of making it 3

According to the law of England, marriage is a contract. Hence a marriage may be declared null and void on the ground of the insanity of one of the parties thereto at the time of entering into such contract. The degree of mental incapacity which must be proved in order to, per se, invalidate a marriage may be stated to be incapacity "to understand the nature of the contract and of the responsibilities and duties it creates" (see

<sup>1</sup> Judgment in In re Toplis, Taylor, Med Jur, II 524 2 Browne, Med Jur of Insanity, p 7 3 Ib , Molton v Zamrouz, 4 Exch 17

case  $D \times D$ , below) Weakness of intellect coupled with undue influence has been held to be good ground for invalidating a marriage (see Case below), hence the suitability or otherwise of the marriage may be one of the points for the court.

Case -Question of insanity in regard to validity of marriage -In giving ju igment in this case Sir James Hannen said. The question I have to determine is whether the respondent at the time of her marriage on the 28th October 1882 was of sound mind so as to be able to enter into the contract of matrimony I am of opinion that every case of this k nd must be decided on its own facts I accept for the nurposes of this case the definition (of soundness of mind) which has been substantially agreed upon by the counsel namely a capacity to understand the pature of the contract and the duties and responsibilities which it creates It is to be observed however that this only conceals for a moment the difficulties of the inquiry for we have still to determine the meaning to be attached to the word understand. If I were to attempt to analyze this expression I should encounter the same difficulties at some other stage of the invest gation with reference to some other thrase and I should still have to determine on the review of the whole facts whether the respondent came up to the standard of samity which I must fix on in my own mind though I may not be able to express it I may say this much at the outset that it appears to me that the contract of marriage is a very simple one which does not require a high degree of intelligence to comrehend it I agree with the bolicitor General (for the plaintiff) that a mere comprehension of the meaning of the words of the promises exchanged is not sufficient. The mind of one of the parties may be capable of understanding the language use I but may yet be affected by such delusions or other symptoms of insanity as may satisfy the tribunal that there was not a real appreciation of the engagement entered into -D v D otherwise M Times 11th March 1885

Case—Undue anfluence on val dity of marriage of an insane— In the su th for the dissolution of the marriage of the Lart of Portsmouth on the ground that he was of weak and afterwards of unsound mind, it was proved that his servants were his playfellows and that he was found driving earls loaded with dung or hay that he was occasionably extremely cruel to his horses and domestics etc etc. He was allulouph of ago in the hands of guardians. One of these a solution persuaded ham forward and the instruction of the undue of the distribution of the solution of the undue influence used —Woodman and Tuly For Med p 800 and Aber erombic Stutents Gualet One July 1900 and Aber erombic Stutents Gualet One July 1900 and Aber erombic Stutents Gualet One of July 1900 and Aber erombic Stutents One of July 1900 and Aber erombic Stutents One of July 1900 and Aber erombic Stutents One of July 1900 and Aber erombic Stutents One of July 1900 and Aber erombic Stutents One of July 1900 and Aber erombic Stu

Aphasia in relation to testamentary capacity—The question whether a person suffering from aphisia is capable of making a will will depend upon the particular case. Each case must be udged on its own ments

It must be laid down as a general principle that no one could make a will who did not posses the power of understand I ing and producing language of some sort. In order to make a will it was necessary for an individual to be able to communicate to others by means of some form of language what he would like to be done after his death. It would not be held to be a will if a person simply indicated by signs before he died that he wanted such a thing to be done nor would it be held to be a will if a person gave directions by word of mouth A person must be capable of understanding language so that he knew either what he said or what was read to him That implied anat he could hear and understand words if he could not read or understand pantomimic language but if he could read and understand what he read then it was not necessary for him to hear or understand pantomimic language that a person understood what was in a document it was not necessary that le should be able to speak in order that he might execute a testamentary deed. He might indicate what he wished by means of writing or by pantomine or in other ways A complete case of auditory aphasia which implied word deafness and word blindness would be incapable of making a will because not lein; able to understand any form of language he would in all probability not be able to communicate his wishes by producing any form of language From a considera tion of the whole subject he had come to the conclusion that organic disease of the brain might render a patient incapable of making a will and that some forms of aphasia might be produced also as one of the symptoms of the organic disease, that some forms of aphasia might render a patient incapable of will making that auditory aphasia if well marked would incapicitate a patient from will making and that some other forms of aphasia such as pictorial word blindness pictorial motor aphasia and graphic at hasia might render a patient incapable of making a will although he was not necessarily mentally incapable —Dr W Eider Brit Med Assocn 1898

## Imposition of Restraint and Lunacy Certificates

When an individual by reasons of unsoundness of mind is mentally incapacitated to a certain extent or degree restraint may be lawfully imposed upon him. This restraint may be either immediate or may be imposed (after certain conditions have been compiled with) by relegation to an asylum. Hence in regard to the imposition of restraint we have to consider three questions (1) What degree of mental incapacity justifies the imposition of restraint by relegation of immediate restraint? (2) What degree of mental incapacity justifies the imposition of restraint by relegation of the individual to an asylum? and (3) What are the conditions which must be complied with before an insane person is relegated to an asylum?

# Degree of Mental Incapacity justifying Immediate

By the common law of Fugland a person of unsound-mind may be lawfully restrained from inflicting physical injury on hunself or others I estraint also imposed in good faith on a person of unsound mind, for the purpose of preventing 1 im from injuring himself would come within the general exceptions of the Indian Penal Code relating to acts done for a person s lenefit (see as 89 and 92) Probably also these exceptions would be held to extend to such restraint as might be necessary to prevent an individual inflicting injury on others. Hence the degree of mental incapacity which in a person of unsound mind justifies the imposition of immediate restraint is mental incapacity to an extent which jenders him dangerous to himself or others Immediate restraint can, however, only be lawfully imposed, either (a) with the consent of the person having lawful charge of the insane individual or (b) without such consent if the circumstances of the case are such that the consent cannot be obtained in time to trevent dancer. Further immediate restraint thus imposed is only lawful so long as the danger exists

Imposition of imme hate restraint is justifiable also under similar conditions in case of delirium from disease eq delirium tremens In imposing immediate restraint in cases of delirium from disease a medical man must recollect that, from the nature of the case the danger is liable to cease suddenly and that restraint continued after danger has ceased may be a ground of action against him

## Degree of Mental Incapacity justifying sending to an Asylum

By the law of both India and Fugland a medical man in relegating an insane person to an asylum must certify that the individual is insine and that he is a projer person to be taken charge of and detrined under care and treatment.

Obviously a proper person to be detained under care in an asylum is one who being insane,1 is dangerous to himself or others and medico legal writers are agreed that this extends also to one who by reason of insanity is likely to injure his own property or the property of others Taylor2 infers that

Not a mply suffering from del rium of disease which renders him a fit subject for a hosp tal not for an asylum ? Taylor Manuat p 700

relegation to an asylum simply for the purpose of treatment is not justifiable but from the remarks of Lord Coleradge CJ in the case of News v Hatl orley (see below) it would appear that relegation to an asylum simply for the purposes of treatment is justifiable in cases where the circumstances are such that efficient treatment cannot be employed unless the individual is so relegated

Case -Legal justification of restraint -In this case Lord Coleri lge C J sail that the examination of a person previous to placing him in an asylum ought to be a real inquiry a real weighing and sifting of evidence a real examination a real serious and solemn exercise of judgment order to ascertain whether an individual came within the definition of the statute of a lunatic idiot or person of unso in 1 mind and a proper person to be taken charge of and detained under treatment. He em phatically dissented from the Attorney General (for the plaintiff) that unless every other means had first been exhausted a person ought not to be placed in an asyl im. The abuse of a thing was no proof that it had Inot a use and early treatment in cases of unsoundness of mind was of the very greatest importance People living in small houses had no power of making provision for such early treatment of relations who might be unsound in mind while relegation at an early stage to a well appointed asylum was calculated to have the best results - Neave v Hall erley Q B D Tin es 3rd August 1885

It may further be pointed out that when lestraint by relegation to an asylum has been lawfully imposed the respon sibility for alleged unnecessary continuance of such restraint no longer rests with the medical practitioner under whose certificate the restraint was originally imposed

### Admission to Asylums in India

When a medical practitioner finds that a patient is suffering from insanity and is satisfied he should be sent to an asylum either for treatment or to prevent him injuring himself or others or perhaps to prevent him destroying property or osquandering his estate it is important the practitioner should know what steps to take. The doctor is also frequently asked by the relatives or friends of a lunatic what steps they must take to hive hims admitted to an asylum. It will not add to his professional reputation if he has to admit he does not know or if the instructions he gives are incorrect. In the case of a private patient in India the following is the procedure—

After consulting the relatives as soon as the practitioner is satisfied from personal observation that the patient is a lunatic and a proper person to be taken care of and detained in an asylum, he draws up a certificate Form 3 (see Appendix)

(a) Note particularly that his examination must be made and his opinion formed separately from any other practitioner

(b) Note the words, " FACTS indicating insurity observed by myself." and be careful not to enter here anything but facts. and only those you have personally observed. Then advise the relation to call in another practitioner-either you or he must be a gazetted medical officer in the service of Government-to draw up a certificate of insanity on another " Form 3"

The relative, if possible the husband or wife, must obtain Form 1, an "Application for Reception Order" (see Appendix), and correctly fill it in and the attached "Statement of Particulars."

If there be no near relative, or if the near relatives be under the age of majority, some friend may fill up the "Application." stating the reason why the nearest relative has not done so.

A letter or telegram should as soon as possible be sent to the superintendent of the asylum to which it is desired to admit the lunatic, asking if he has accommodation, specifying what scale of accommodation is desired. It is well also to indicate the nature of the insanity, such as a "docile idiot," a "homicidal maniac," a "suicidal melancholic," etc.

The relative, or, in his default, the friend or guardian, then

takes to an authorized magistrate-

1 The lunatic.

2 The Form of Application.

3. The two medical certificates, Form 3 (one must be given by a gazetted officer)

4 The answer of the superintendent of the asylum.1

' (1) This is not necessary in the case of "a lungite who is dangerous and unfit to be at large." but many magnetrates adjourn the case till they have information that accommodation is available. This involve delay and a second attendance in court. If the delay involve "more than seven clear days" between the medical examination and the presentation of the petition, the certificates become invalid. New examinations have to be made involving fresh fees to the examiners and loss of tune to all concerned.

(2) In the case of a European soldier the Order for Reception is issued by

an Administrative Medical Officer

(3) In the case of a person "wandering at large" any police officer, not below the rank of an Inspector, or who is in charge of a police station, who has reason to believe such person is a lunatic, may arrest him.

(4) Or if he has reason to believe he is dangerous by reason of lunsey, he SHALL arrest him and have him placed forthwith before a magistrate

Commissioners of Polico are magnificates for this purpose.

If the magnificate considers there are grounds for proceeding further he may order the detention of the alleged lumnite for a period not exceeding ten. may order has detection of the alleged hunauts for a period not exteeding ten days to enable a medical officer to determine if the genera is certifiable in this case this magnitude on much as Reception Graf off test and the second of the second of the second of the second of the XN o "Form of Application" (Form 1) is necessary in this case. Instead of a "Statement of 1 articulars, an analogous "Medical History Sheet." is drawn up partly by the peloce, putily by the medical officer. If ten days to not long enough for the medical officer to make his diagnosis, the magnitude may authority further determinent the alleged lonaur, for

periods not exceeding ten days at a time, up to a total period of thirty days from the date on which he was first brought to the magnitude

5 A certificate from a medical man to the effect that the lunatic "is in a fit physical condition to travel to the asylum"

If the lunatic be violent or obstreperous or in such a condition that the visit to the magistrate is likely to be harmful or madvisable, the magistrate can, and should, if satisfied with

the evidence, dispense with the lunatic's personal attendance Note—The Act distinctly orders "The petition shall be considered in private" Chap II, para 9 Many magistrates are in the habit of holding the inquiry in open court to the great confusion and humiliation of the relations This frequently leads to prinful exhibitions on the part of female lunatics before a ribald audience, and should never be permitted

According as the magistrate is satisfied or not with the evidence he either issues an 'Order for Reception' into the

asylum or dismisses the petition

## Safeguard to preserve Liberty of Non-Insanes.

In England, France, Germany or Austria, it is a criminal offence for any officer of an asylum, or any one in any way in partnership or relationship by blood or otherwise with such an officer, or person having any pecuniary interest or whose relation or partner has any interest in such an asylum to sign a certificate of lunacy

In India, though no legal offence, it is extremely undesirable that certificates (Form 3) should be given by an officer of an asylum when any other gazetted officer is available

The principle which underlies the European law is that should any certifying medical man through carelessness ignorance, error in judgment or diagnosis, through corruption or through the machinations of designing persons, intentionally or accidentally give a certificate which deprives an individual of his liberty, immediately after admission his diagnosis is subject to the criticism and observation of the expert officers of the asylum, who thus constitute a veritable "Court of Appeal," and will without unnecessary delay rectify the error of the certifying practitioner

If, however, the certifying surgeons be one or both, also the officers of the asylum, it is certain that if they have acted through malice or corruption they will not correct their offence till obliged to do so Such a possibility is remote, but the Indian law should take the same safeguards as the law in other

countries

If their certificates be based on careless observation, or on errors in diagnosis only a man of absolute probity could be expected to correct his error by getting the pitient discharged forthwith. The average individual might be inclined to postpone the correction of his mistake for some time "to save his face."

Some years ago an inquiry showed that of a total of 58 inmates of an asylum, 55 were admitted on the certificate bor of the superintendent, the second certificate being in many cases signed by his assistant. This asylum was situated in a city having at least a hundred medical practitioners, and a dozen excited officers.

### Serious Obligations on Filling up Lunacy Certificates.

From the above considerations it is evident that even examining a patient previous to filling up and signing such a certificate a medical man is bound to exercise extreme care. The social stigma which attaches to any person who has been detained in an asylum is a terrible infliction to a sensitive mind, and makes it necessary that no case should ever be sent there without due cause, and that every safeguard should be taken to prevent the possibility of a same person being incarcerated in an asylum As remarked by Lord Coleradge, his examination should be a real inquiry, a real weighing and sifting of evidence, a real serious and solemn evercise of judgment Negligence or want of care on his part (not simply an error in h judgment) renders him hable to be cast in damages, on an action being brought against him (see Hall v Semple, below) Obviously, a medical man, unless be has himself observed facts indicating insanity in the patient is not justified in signing such a certificate, for to rely solely on the statements of others in such a case amounts to culpable negligence.

Case -Negligence in filling up a certificate of lunacy-heavy damages (Hall . Semple S T & F 337) -In this case the plaintiff had been his charged from an asylum on the ground of informality in the certificate. This certificate was dated July 29, but the visit and examination were made on June 18 The defendant was one of the medical men who had signed a certificate of the plaintiff's invanity. The evilence, how ever, went to show that Hall although a very had tempered man, was not really insane and that the defendant had relied too much on the statements of the wife and other interested persons. Compton, J, in summing up the case to the jury said "The principal questions to which I desire to direct your attention are these first, whether you think that he (the defendant) signed the certificate untrue in fact, negligently and improperly and without making proper and sufficient inquiries. It will be for your consideration what degree of care is necessary, so as to make out by the absence of it culpable negligence. It is not a mere mistake or error in judgment which would amount to such pegligence, but you must be satished that there was culpable negligence And, again you are

not inquiring into an error in judgment, but whether the defendant has been guilty of that culpable negligence which I have explained and described to you-negligence in not making sufficient inquiries, the examination not having been sufficient in his own judgment. The jury found that there had been culpable negligence, and awarded the plaintiff £150 damages

Further, the facts relied on and embodied in the certificate as facts indicating insanity must be facts which really do so Numerous instances are quoted by Taylor,1 on the authority of Dr Millar, of certificates filled up with facts other than "good facts," or facts really indicating insanity. Some of these consist of mere statements of the existence of peculiarities of appearance or temper, not of themselves sufficient to show the existence of insanity, eq Has an insane appearance, or is violent in temper and very abusive, or refuses to take medicine Others, again, are statements either to the effect that the individual labours under delusions, without specifying precisely what these delusions are, or statements to the effect that the individual labours under a particular belief, such as from its nature may possibly be true unaccompanied by any definite statement to the effect that such belief has been inquired into and found to be untrue A fact to be a good fact really indicating insanity, must either clearly show the existence of a delusion, or the existence of such conduct as cannot be accounted for on the supposition of sanity

All the asylums in India are (1914) Government institutions, although the law permits of licensed private asylums Private patients may be (1) Voluntary Boarders, (2) Patients admitted be "Reception Order on Petition" and (3) Patients committed by Presidency High Court or District Court after inquisition

The following list of the present Government asylums in

India may be useful for reference-

In Bengal Presidency, (1) Bhowampore, (2) Berhampur Central, (3) Patna In Assan, (1) Dacca, (2) Tezpur In Buhar and Orissa, Patna In United Provinces, (1) Agra Central Asylum, (2) Bareilly, (3) Benares In the Panjab, Lahore Central In Burma, (1) Rangoon Central, (2) Minhi. In Madras Presidency, (1) Madras Central, (2) Calicut; In BOMBAY PRESIDENCY (1) Naupada (3) Vizagapatam Thana, (2) Colaba, (3) Ratnagiri, (4) Ahmedabad, (5) Hyderabad (Sind), (6) Dharwar In the CENTRAL PROVINCES, (1) Nagpur, (2) Jabbulpur. Of these only Bhowampur. Agra, Lahore, Rangoon, Madras, and Yerrowda admit Europeans.

With the admission of the lunatic into the asylum the

<sup>1</sup> Taylor, Med Jur . II to 512

### INSANITY AND THE STATE

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responsibility of the medical jurist ceases. The question as to the care and the ultimate release or otherwise of the lunatic rests with the asylum authorities.

Specimens of the necessary forms are given in Appendix M. I, for further particulars regarding admission to and detention in Indian asylums of private and public patients, the "Indian Junacy Manual of 1913," by Major R Bryson, should be consulted.

### CHAPTER XIX

## LEPROSY IN RELATION TO THE LAW.

BY ARTHUR POWELL,

Inspector of Lepers, Bombay !

Although the Lepers Act was passed in the year 1898, and its provisions extend to the whole of British India, it does not come into force in any part thereof until the Local Government has declared it applicable thereto. The Act has gradually been put in force so that now there are few districts to which it does not apply

The Act provides not only for the segregation and treat ment of pauper lepers, but also for the control of lepers following certain callings The object of law is to segregate such lepers as are capable of disseminating the contamon of leprosy and so protect the public

A 'leper" within the meaning of the Act is defined as "any person suffering from any variety of leprosy in whom the

process of ulceration has commenced"

It will be readily seen that this definition is by no means scientific The ulceration need not be leprous ulceration Any form of ulcer, whether arising from trauma, such as abrasion or wound, from varicose veins, vaccination, etc., is sufficient to bring the leper within the Act Further, the ulcer may have completely healed at the time when the leper is arrested

Probably the most dangerous lepers are those in whose nasal secretion leprous bacille are found by the million. The writer in such cases often fails to observe any ulceration. If he does not personally observe ulceration or scarring, he cannot certify

the leper as a leper within the meaning of the Act

Certain pathologists maintain that the presence of leprosibacilli and leucocytes in the nasal secretion is sufficient evidence of "ulceration." If this be so they must include gonorrhæa and all catarrhal conditions under the heading of " ulceration "

Under the Act any police officer is empowered to arrest without warrant any person who appears to him to be a pauper leper

- A ' pauper leper ' is defined as a "leper (a) who publicly solicits alms or exposes or exhibits any sores, wounds, bodily ailment or deformity with the object of exciting charity or of obtaining alms or
- (b) who is at large without any visible means of sub-\* sistence...

A person so arrested must be taken without unnecessary delay before an Inspector of Lepers, who if he finds he is not a lener gives him a certificate to that effect and at once releases htm

If the Inspector finds the arrested person is a leper as defined by the Act, he gives a certificate to that effect. The leper is taken to an authorized magistrate who, if satisfied with the evidence commits him to an asylum to be detrined

The Act also gives the Local Government power to order that no leper within any cazetted area shall-

- (a) Personally prepare for sale or sell any article of food or drink or any drugs or clothing intended for human use.
- (b) bathe wash clothes or take water from any public well or tank or
- (c) drive conduct or ride in any public carriage plying for
- hire other than a railway carriage, or (d) exercise any trade or calling which may by such notification be prohibited to lepers

### LIFE ASSURANCE AND ACCIDENT COMPENSATION

### CHAPTER XX

#### LIFE ASSURANCE.

MEDICAL men are associated with life insurance companies as medical advisers or as medical examiners, in both of which capacities it is the duty of the physician to detect any unsatisfactory deviation from the normal standard of health of the applicant, and any attempt by the applicant to conceal any unsoundness and to enable the company to appreciate the extent to which the unsoundness may shorten life

Life assurance is a contract for the object of making provision for a family, or otherwise, through the premature death of the head of the house, or for borrowing money for commercial purposes in which an individual enters into an agreement with a company to pay them each year he lives a certain fixed sum, or 'premium, in return for which the company issue a 'Policy of Assurance, or undertaking to pay a certain fixed sum on the death of the assured, whenever this may happen

This is the simplest form of the agreement, variations, however are frequently introduced. Thus the yearly premium may be made payable in monthly, quarterly or half yearly instalments, or the assurance may be effected for a term of years only, the liability of the company ceasing on the expiry of the stated term, or it may be arranged that the sum assured shall be paid on the assurad attaining a certain age, 'Indowment assurance,' or at his death, whichever may first happen

For a given sum, payable at death or at a fixed age, the yearly premium to be paid by the assured must obviously be more or less, according to this 'expectation of life,' that is, according to the number of years he may reasonably be expected to hre.

An individual's expectation of life depends (1) on his age, and (2) on his freedom or otherwise from any special influence exists, the individual's expectation is said to be normal Hence

arises the general question, on the answer to which the ordinary scale of premium rates of assurance companies must obviously be based, namely—(1) What is the normal expectation of life at various ages? But an individual seeking to assure may be subject to some special influence tending to reduce his expectation of life, and hence two other questions arise, namely— (2) What are the special influences which tend to shorten life, and to what extent do they do so? and (3) How is the existence in any given case, of influences tending to shorten life ascertured!

## The Normal Expectation of Life at Various Ages.

The expectation of life is calculated from the general deathrate which, being fairly well fixed in a country like England, gives a fairly fixed expectation of life for different ages amongst individuals subject to the same conditions as those to whom the statisties refer. The following is one of the most recently published tables showing the expectation of life for men in Loreland.

FIRETRING OF LIFE WIR MEN OF FROLINGS

Com- pleted agr	Years	fom pleted age.	Years.	Com pleted age	ice s.	Com- picted age	Years,
0	89-91	82	81 42	56	15 86	80	4-93
5	4371	' 53	90 74	57	15 26	181	4-66
10	47-05	34	30 07	58	14 68	82	4 41
11	46 31	1 35	29:40	59	14 10	[ 83 f	417
12	45 54	38	23.73	60 1	13 53	1 81	395
13	41 "6	'37 '	28 06	61	1296	85	9-73
14	43 96	. 39	27-33	62	12 41	J 86 1	\$ 53
15	43 18	33	26 72	63	11 87	87	3.34
16	42 40	40	26 06	64	11 31	83	3 16
17	41 64	41	25 3.3	65	10 82	59	3.00
18	40.90	42	24-73	66	10.33	90	281
19	40 17	43	24 07	67	9-82	91 !	2-60
20	89 48	1 44	23 41	68	9 56	92	2 55
21	38 60	45	2276	69 1	8-90	P3	2 41
22	38 19	46	22 11	70	8 45	. 91	2-23
23	37 46	47	21.46	71	8 03	95	2 17
24	96-7J	48	20-83	72	7 62	( 96 1	206
25 20	9C 12	43	20 17	73	~-92	, 97	1.35
20	35 44	י שבר	19 54	74	6.83	99	1 65
27	3477	5 54	1830	. 35 1	દ્વસ્ક	1 23 1	1.46
23	34 10	52	18 29	76	6 15	li l	•
29 80 ;	33 43	53	17 67	1 77	5 82	3 1	
20: 1	32 76	54	17:06	78	5 51	4 [	
31	32-03	55	16 45	79	5 21	! 1	

<sup>1</sup> From Bowne s Manual-Fuglish Experience, No 3 Males

These are actuarial facts, based on an enormous number of fixed data and worked out by mathematicians. And on such tables assurunce companies base their ordinary British premium rates for assuring the lives of men resident in Great Britain whose expectation of life is normal. Some insurance companies allow a slightly higher estimate than in this table. Lives deviating from the normal standard of health are 'loaded' with an extra premium if accepted.

#### PURE, OF 'UNLOADED, 8 PER CENT PPEMIUMS

The 'pure or unloaded 3 per cent premium is the sum which, if paid yearly during the period of expectation, will, at 3 per cent interest, amount at the end of that period to the sum assured. Assurance offices, of course, add to the 'unloaded premium a certain percentage to cover cost of management and profit

Age	Expectation of hea thv male lives from experience of twenty life off es in Logland	Unloaded 3 per cent. premium in a erling per £100 assured	Unloaded 3 per cent, premium stated as percentage on the sum as ured.
		£ 1 d	
20	42 06	187	1 490
25	38 44	1 12 6	1 625
30	34 68	1 17 7	1 880
85 .	1 81 03	2 3 10	2 190
40	27 40	2 11 9	2 588
45	23 79	8 2 3	3 112
50	20 31	3 16 0	3 800
55	16 93	4 14 6	4 725
60	19 83	5 19 9	5-938
65	11 01	7 14 8	7 705

For women in Europe the expectation of life is greater than for men by about three years all through, except during the child bearing period, when it is somewhat less

A rough rule for calculating the 'Expectation of Life is —Between the ages of 20 and 45 iss the niced number 00 Deduct the present age of the person from this number, and half the remainder gives his expect ancy Between 20 and 30 the result is a trifle below the average, and over 40 is slightly above. For estimating the expectancy of those over 45 take 90 as a fixed number, instead of 90 as a fixed number, instead of 90 as a before

Another method which gives a slightly lower expectancy is to add to the actual age of the individual two thirds of the difference between it and 80 a limit of life which is certainly more reasonable than this of 86 Thus deduct present age 42 from 80 result 38, and two thirds of this number, 25, the net result is the probable duration of life—

67 years

For India although no authentic official tables have yet been published showing the normal expectation of life amongst natives of India, owing to the Indian birth and death statistics for native lives being still incomplete and untrustworthy, the litest results by the medical adviser of a large insurance company in India are summarised in Appendix XII. On the expectancy of native lives in India, as compared with Phropean lives, another Indium insurance officer wrote—

"To some years past I have had frequent opportunities of scaling the lamby his of Natures of the uninumy class, having boas tree requestly called into consultation at houses in the Native parts of Calenta. I may state in general terms that in such houses there is an entire absence of all ordi nary sanitary arrangements. In almost all houses that I have seen, even of the best class, there seems to be free communication with the sewers, and the smell of sewer gas into be found in most of them. In fact, the adoption of underground sewers in Calenta has introduced a new element of danger into Native houses, and were it not for the open character of Native houses, I am convinced that ever gas diseases would be more prevalent even than they are at present. Stanking diams in the lower parts diseases voices are the relief, and shother and diphthem are common diseases?

unscares
"Again another well known fact is that diabetes is a very common disease amongst middle aged Natives who are in easy circumstances, in a ratio greatly in excess of that which obtains among Europeans. It is not so rapidly a fatal disease as in Europe, but it shortens life, most assuredly."

The same remarks apply to the poorer classes of Eurasians and Armenians and Jews who live under bad, invanians conditions I consider it my duty to express a most decided opinion that though the constitutions of health's Natives may not be much inferror to the Turopean standard, from a medical point of view, their habits modes of life and the insaniary conditions amidst which this, the arm most distinctly inferror to the I uropean standard and render them more liable to acute diseases, necessive the risk of assurance. 1

The rates however at which one of the principal assumance companies in India assumes healthy native lives, appear to correspond roughly to an expectation—between twenty and sixty—of two-fifths of the difference between ninety and the age eg at age thirty the expectation apparently calculated on is about twenty-four years

For European and Eurasian lives in India the expectation of life has been worked out in some detail (see Appendix XII, also the following table) from which the extent by which the expectation of healthy Europeans is reduced by residence in India may be arrived at Approximately. The expectation shown, in B, it will be observed corresponds approximately to half the difference between the age and eighty-six (not two thirds of the difference between the gas and eighty).

### TABLES OF EXPECTATION OF LIFE IN INDIA.

A Table of expectation of life compiled by J Westland Esq. Beng CS, from the experience of the Bengal Uncovenanted Civil Service Camily Pension Fund, European and Eurasian lives, period of observa

tion, 1837 to 1802 This is based wholly on Indian experience
B Table of expectation of life compiled by A i Cox, I'sq, Mad
C S, from the combined mortality statistics of the Bengal, Madma, and
Bombay Ciril Services, European lives only, periods of observation—
Bengal, 1850 to 1872, Madms 1700 to 1802, Bombay, 1700 to 1800,
Bombay, 1700 to 1807, Bombay, 1700 to 1800, Bombay, 1700 to 1800, Bombay, 700 This is based on Indian experience up to the ago of fifty
But see Appendix XII

Age	Expecta tion A	Expects tion B	Ago	Expecta-	Expecta tion B,	Age	Expects tion A	Expects tion B.
20 22 24 26 28 80 82 84 86 88	91 48 29 85 28 82 26 84 25 39 24 02 22 72 21 49 20 28 19 07	33 65 32 49 31 41 30 36 29 31 28 26 27 23 26 19 25 16 21 13 23 10	42 44 46 48 50 52 54 56 58 60	17 86 16 69 15 57 14 53 13 55 12 63 11 71 10 72 9 63 8 72	22 12 21 18 20 29 19 29 18 43 17 38 16 25 15 29 13 91 12 74	62 64 66 68 70 72 74 76 78 80	7-93 7-27 6-62 5-92 5-20 4-50 3-80 3-10 2-41 1-72	11 39 10 54 9 52 8 54 7 62 6 75 5 95 5 23 4 57 3 99

# Special Influences tending to Shorten Life.

When an individual who proposes to assure is found to be subject to a special influence tending to shorten life, an assurance company may either refuse altogether to undertake the risk or may agree to assure the life, charging an enhanced rate of premium or louding' as a compensation for the individual s diminished expectation. This enhanced rate may be charged in one or other of the following ways —

1 According to a special table of rates fixed by the company for individuals subject to a particular influence eg

residence in a tropical climate

2 The ordinary premium rate for an individual whose expectation of life is normal may be charged, plus a special additional rate, calculated either as a percentage on the sum assured or on the ordinary premium. This is the method commonly adopted when the influence reducing expectation is the individual's occupation.

3 By adding a certain number of years to the assured s age, and charging him, instead of the ordinary rate corresponding to his actual age the ordinary rate for an individual so many years older. This is the plan generally followed when the influence reducing expectation is the existence of disease or of a predisposition to disease. It should be noted that when this

method is adopted the number of years to be added to the age must always be greater than the number of years by which it is estimated that the individual's expectation is reduced little consideration will show that, where normal formula is applicable, the addition must in round numbers, be one and a half times the reduction of expectation, ie just so many years as will raise the assured a actual age to the age at which the reduced expectation exists 1

The special influences tending to shorten life may conveniently be considered under three heads, viz (1) External. (2) Hereditary, and (3) Acquired, personal influences

#### 1 External Influences

The chief external influences likely to reduce expectation of life are (1) locality of residence and (2) occupation

- 1 Residence in an unhealthy locality -- Practically, assurance companies may be said to recognize three classes of localities, viz. (1) specially unhealthy, (2) unhealthy and (3) ordinary localities The west coast of equatorial Africa is considered to belong to the first class and companies will only assure lives resident there by special agreement and at a special rate. India and tropical countries generally are looked on as belonging to the second class During time of residence in a locality of this second class some companies charge in addition to the ordinary premium an extra rate, in some cases as much as 14 to 2 per cent over annum on the sum assured Many companies however publish a special table of rates for residence in India and the tropics The rates shown in these tables vary considerably approximately the amount by which they exceed the corresponding ordinary or English rates ranges from 4 to 21 per cent per annum on the sum assured In forming an estimate of an individual's expectation of life, it should not be forgotten that of a number of localities to which the same assurance office rate applies, some may be more unhealthy than others Low lying, marshy districts, for example are more unhealthy than well drained ones, and in England towns are, as a rule, less healthy than country districts. Thus Guy gives the expectation of life at thirty, for the whole of England, as 341 years The records of benefit societies in rural districts, however show an expectation of 38 years at the same age, while in Liverpool and Glas gow the expectation at thirty is respectively twenty seven and twenty-fite years? In Ingia again, certain localities age well known to be more unhealthy than others
- 2 Occupation,-The occupation of an individual may tend to reduce his expectation of life by exposing him to rick
- For more precise calculations a table of expectation of life must be employed thus. Find the expectation corresponding to the individual; a setual age, from this deduct the number of years by which it is estimated his expectation has become reduced, then find in the table the age corresponding to the reduced expectation the difference between this and the actual age is of course the number of years to be added.

  \* Guy, quoted by Sieveking, Medical Adviser in Life Assurance, p. 119

- of (1) mechanical injury, (2) absorption of poison, or (3) contraction of disease, or of a hibit tending to shorten life For mortality in different trades see Appendix XIII
- 1 Mechanical injury —The chief occupations exposing to this risk are as follows multary and naval service. In war times extra rates of five to twenty gumeas per cent have been charged to officers actually engaged During time of peace officers of the navy are usually charged an extra rate of half a gumea per cent within certain limits, and a special higher rate beyond! In India an extra charge of about 11 per cent per annual (which covers war risk in India) is usually made for military employ, engine drivers, sailors, and miners. The usual extra charge for these occupations is 1 to 2 per cent additional on the sum assured. Other occupations exposing to this risk and for many of which extra rates are charged, are mining engineers and agents, makers of explosives quarry men and others using explosives, railway officials generally, policemen, firemen, gamekeepers, builders, plumbers, and girziers, and all occupations invested contact with horses
- 2 Absorption of pouso—This risk attends the manufacture of chemicals generally and specially the manufacture of compounds of the more poisonous metals. Occupations involving constant contact with such metals or their compounds (e.g. arseine, mercury, lead, and copper) are also exposed to it. Again, occupations involving exposure to poisonous vapours. e.g. phosphorus vapour, introus acid vapour, sewer gases, etc., involve this risk.
- 3 Contraction of disease, or of a habit tending to shorten life —Occups tones exposing to raise of this kind are (al) very dusty occupations, as granders, millers, masons, and coal miners, Sieveking remarks that few of the Sheffield steel granders attain the age of thirty five, (b') sedentary occupations, especially if carried on in badly ventiated rooms, (c') occupations lies by the cavity of the acquirement of habits of intemperance, eg publicans and others engaged in the manufacture or sale of alcoholin liquors. Sieveking 2 points out that while between the ages of forty five and fifty five the general mortality for all England is 18 per 1000, the tale between the same ages in the case of tim and bestrably keepers is 28 per 1000, and in butchers (probably from the same cause) 23 per 1000. There is some reason also to suppose that much railway travelling injuriously affects health, and hence that occupations involving this tend to shorten life. It may also be noted that, according to Guy, the average duration of life among members of the learned professions is sevently as:

#### 2 Hereditary Influences.

I The influence of the constitution of the parent on the life of the offspring may convey hereditary disease. The percentage of cases in which hereditary transmission of disease is traceable, as variously stated by different authorities. Much of this variation arises from difference in the fact accepted as showing hereditary transmission. Thus, if the only fact accepted and indicating this is affection of the parents, a lower percentage,

of heredity will be found than when affection of the grandparents or any of their children is accepted. The following are the chief hereditary diseases, and the main facts derived from European experience, bearing on the question under consideration. Little or no information is available as regards hereditary transmission of disease among natives of India.

- 1. Tubercle of the lung—The percentage of heredity of thus disease is vanouely stated at 25 to 60 per cent. Temeles appear to be somewhat more liable to inherit it than males and the disease seems to be more liable to diseased from mother than from father to child. Sweeking con siders that where the personal condition of the individual is good, the death from consumption of one parent, or of two of the individual brothers or asters should be met by an addition of seven to ten years to the age, and that if both parameta have deed of the disease the lie should either be rejected allogether, or twenty to twenty five years added to resures sevent localine.
- 2 Gout.—Percentage of heredity equals about 50 Sieveking states that the usual practice is to add three years to the age for hereditary liability to gout, but considers this addition insuleguate.
- 3 Cancer Percentage of heredity, 8 to 33 Twice as many females as males die from this disease hence the addition to age for hereditary inability to cancer should be greater in the case of females, as cancer is mainly a disease of later life
- 4 Rheumaham Percentage of heredity about 30 Acute rheu matism although not so likely to prove directly fatal as other hereditary disease may damage the heart and so movar expectation
- 5 Insanty, and brain duesse generally—Percentage of heredity of insantly, 23 to 60 Hereditary transmission of insantly appears to be more common in the upper than in the lower classes of society, and to take place more frequently from mother to daughter than from father to son Other brain diseases e g epidepsy exhibit a marked tendency to hereditary framsmission and frequently brain disease in one form in the parents is transmitted in another form to the children.
- 6 Syphila and scrofula.—Hereditary transmission of these diseases is chiefly liable to affect the expectation of life of an adult indirectly,  $\epsilon g$  by rendering him less able to resist an attack of serious disease
- Heredity to long life Limited family vitality requires a substantial increase of premium

The importance of hereday used to be exaggerated says Six William Gardner, but the tendency now was too much the other way, partly in consequence of the discovery of the tubercular bacalins and the difficulty of reconcling that with the doctrine of heredity I is was the fashion nowadays to regard heredity as a misapprehension or superstition. After long the construction of the same time that the doctrine of heredity I is was the fashion produced by the same time that the construction of the construction of the same time to the construction of the construction of the same time to the construction of

Inducet hereditary influences—Great disparity of age (and, according to some, near consanguinty) between the parents or extreme youth of the mother, may exert an indirect injurious effect on an individual's expectation of life by interfering with his development or power of resisting attacks of disease. Under the head of indirect hereditry influence the influence of sex on expectation may also be considered

The general expectation of life among females is slightly greater than among males Females, however, are subject to the special risk attendant on child bearing. The risk does not attach to the pregnant condition, but to parturition, and attaches specially to a first delivery Dr Allen's statistics collected from various sources, give as the proportion of deaths (from puerperal causes) to deliveries one in sixty two for primipare and one in one hundred and twenty four for multipare Temales therefore pregnant for the first time Sieveking advises, should be charged a special rate and it is a question whether an extra rate should not also be charged to multiparæ Such extra rates may be remitted when parturition has taken place or the period of child-bearing has come to an end Frequent previous miscarringes often indicate a syphilitic taint, and justify an extra rate being charged no matter what may be their alleged cause Hereditary tendency to apoplexy cancer or other diseases usually coming on late in life, may be dealt with by declining a whole-term policy and granting at ordinary rates an endowment policy payable at death or the age of 55, 60 or such age as will reduce the risk

# 3 Acquired Personal Influences.

1 A previous attack of disease may be deemed to have reduced expectation. If the disease is (1) serious in nature and likely to recur, eg cancer, apoplexy, epilepsy gout etc, or (2) likely to have impaired the functions of some important organ eg sunstroke acute rheumatism disentery etc., or (3) one indicating serious constitutional taint or impairment of function, eg fistula piles, etc.

<sup>1</sup> Op cit, p 75 The older the primingara the heavier should be the rate the mortality increasing after 50 years of age a hereditary history of cancer could be smored in endowment assurance maturing at the age of 45 or 50

whilst is should carry extra rates for a whole his polary

1 Powell and Vanson have definitely demonstrated that the life span of
the gunea worm in its human host averages about one year—from nine to
strice months If therefore a person has left a district in which he ence
or many times contracted gunea worm and has resided in a place free from
need be imposed and a half provious to the time of examination no extra
need be imposed and a half provious to the time of examination or extra

In some cases the expectation may be deemed to be so greatly reduced as to render the life ununsurable. In other cases there luction of expectation may be met by an addition to the age. No general rules can be laid down applicable to all cases as to the course which should be followed bleveking however, states that a single, well marked attack of soute rheumatism confining the individual to bed for six weeks or more just fees an addition of seven to ten years to the age and that the addition abould be greater if there has been a recurrence of the disease. The sam, authority also considers the usual deduction of three years from expectation for an attack of gout to bittle 1.

- 2 Acquirement of a particular habit—The habit reducing expectation, most commonly coming under notice, is intemperance. Intemperance Intemperate habits, according to Mr. Neison, reduce expectation so greatly as to bring it down (in the middle ages of life) to about 19½ minus one-fifth of the age, ag at thirty to 19½ minus six, or 13½ years. Abuse of narcotices other than alcohol, ag opium and habits other than over-indulgence in narcotices may also reduce expectation.
  - 3 Existence of a morbid or abnormal condition such as-
- (1) Blandness—Usually met by an ad lition of ten years to the age. (2) Herma—This, unless the individual agrees to wear a truss renders his life tunnsumble (3) Loss of Limb or malformation interfacing with the power of locomotion. For loss of a leg three years is usually as died to the age but Sievelong thinks this insufficient. (4) Open Ulcers—These must be include before the life can be accepted (5) Pasfess—No adil corposed the individual corposed corposed the individual corposed corposed the individual corposed
- Finally, it should be remembered that in the same crost their may exist a combination of influences reducing expectation. The locality of residence occupation or habits of an individual may, for example, have the effect of augmenting the damage caused to his expectation of life by diverse or a tendency thereto. Thus residence in a tropical climate may augment the damage to expectation resulting from cetrain diseases of the digestive organs. An occupation involving much exertion may augment the damage due to certain affections of the circulatory system, or one involving much anxiety of mind, the damage due to a tendency to brain disease of mind, the damage due to a tendency to brain disease. Themperate habits again microsost the damage due to disease generally and especially the damage resulting from affections of the nervous and digestive organs. For the detailed eximination for these didects eve below.

O Mulrhead, causes of death amongst Scottish Widows Fund A D Secy, 1892
Op cit, pp 97, 143

# Examination of Applicant

HOW THE EXISTENCE OF INFLUENCE TENDING TO SHOPTEN LIFE IS ASCERTAINED

The usual method is as follows. The individual proposing to assure is—(1) Supplied by the insurance company with a series of printed questions to which written answers are required. (2) Required to refer to two or more personally acquainted with him (one being his usual medical attendant) and to these referees of the proposed assures a similar series of questions are addressed. (3) Examined by a medical man acting on behalf of the company who also is usually supplied with a series of questions to be put to the proposed assuree—in the soheme of life insurance without examination the applicant is made to pay much higher rates for the extra risks—and (4) required to sign a formal declaration to the effect that his statements are true and are to be taken as forming the basis of his contract with the assurance company

Printed questions—The object of the questions put to the proposed assuree is of course to ascertain whether or not he is subject to any hereoditary or other inflaence tending to shorten life and being put in a categorical and formal way delicate questions such as to previous syphilis can be asked as a matter of course. In answering them and generally the assures is bound to exercise the utmost good futh in the representations he makes to the assurers failure in this respect on his purt will as a general rule render the policy void Further save in very exceptional cases misrepresentation or concealment of material facts will render the policy void. Hence arises a fourth question in regard to life assurance which presently must be considered namely. Has there been misrepresentation or concealment of material facts?

Referees — Any person the assuree nominates as one of his referees may refuse to act in such capacity but if he under takes the duty he is bound like the assuree to excruse the utmost good faith in discharging it at the risk should he fail in doing so of rendering himself hiable to an action should loss ensue. Hence the usual medical attendant of the proposed assuree if he accepts the duty of a referee is bound to answer truly all questions put to him and to disclose overy material fact known to him or should he have no knowledge as to any particular fact in regard to which information is required from him to state so distinctly

Medical examination —The examination of the proposed assures should be thorough and in order that nothing may be omitted should be conducted in regular order somewhat as tollows.

MEDICAL ENAMINATION OF THE PROPOSED ASSURED

General external examination —This may (a) directly or (b) indirectly disclose the existence of a condition tending to shorten life. The chief conditions comin, under head (a) are blindness hermin loss of a limb or malformation interfering with the power of locomotion open ulcers and deafness.

(1) Gait, manner, and general appearance -This may indicate actual disease of the nerve centres or of a tendency thereto, or premature decay the individual looking older than his age or existence of a habit tending to shorten life ea intemperance (2) Shin disease a disease of this class may indicate a constitutional taint of intemperate liabits Weight this should be in fair correspondence with the height From the table on p 45 it will be seen that roughly a male European o feet 7 inches in height should weigh about 150 lbs and 5 lbs more or less for every inch above or below this height The proportion borne by the weight to the height appears in the case of natives of India to be as a rule lower tlan among Luropeans Very low or very high weight in proportion to the height or marked recent gun or loss in weight should be looked on with suspicion A variation in weight of more than 20 per cent from the standard is re\_arded by most authorities as incompatible with normal health (4) \ accination - The un vaccinated or the unprotected by a previous attack of smallpox are considered unsound and are not accepted at all by several offices or if accepted death from smallpox and its sequely are excluded from the contract or an extra premium exacted

In England the percentage of deaths from d seases of the chief systems to total deaths is about as follows respiratory 30 (one third of these from pl thiss) increose 18 circulatory nearly 7 digestive about 51 and centio urinary about 2 per cent

In Inda a very large proportion of the total deaths (in the Bombay Presiltency about & per cent) are attributed to fever. In ordinary lears bowle compiants come next leng credited with (in Bombay) about 84 per cent of the total deaths. In exceptional years the deaths from cholera exceed those from bowle complaints. Thus in 1677 (the famine year) in Madars 1 22 per cent and in Bombay 9 per cent of the total deaths were reported as from clotlers.

The various systems of the body should next be examined

<sup>1</sup> The total death rate in Madras in 1877 was 53 9 per 1000

Respiratory system .- Respiration should be quiet and easy, its ratio to the pulse 1 to 4 or 5, and not quicker than 20 per minute The chest should expand in all directions, and there should-especially below the clavicles-be no flattening Deep inspiration should cause no distress There should be no hydity of the hps, or tips of the ears or fingers, and the individual ought to be able to count aloud rather slowly 1 to 20 or 30 without taking fresh breath. The circumference of the chest should be in fair correspondence with the height, and in suspicious cases the vital capacity' (i.e. the volume of air expelled after the deepest possible inspiration by the deepest possible expiration) should be ascertained. The chest should be examined by percussion and auscultation and special inquiry made as to previous hemoptysis, cough, loss of weight. single occurrence of hæmoptysis, Sieveking thinks, should be met by an addition of fifteen years to the age, and the life should be altogether rejected if examination shows decided evidence of the existence of tubercular deposit Out of 524 deaths from phthisis in the Scottish Widows Assurance Society, Dr Muirhead found that certainly not more than 35 per cent exhibited any family predisposition, and this percentage corresponds closely with the 34 per cent, of Dr Williams and with the 36 per cent of Dr Cotton A family history of phthisis is just as common amongst non-consumptives and he formulates the statement that 15 per cent at least of proposers to the Society for assurance and of those accepted by the Society will show a record of death by consumption among their parents" 1

Nervous system.—The principal symptoms indicating evistence of actual discusse of this system are paralysis, want of co-ordinating power hyperesthesia aresthesia, and certain affections of the special senses. A tendency to discuss of this system, again, may be indicated by repeated attacks of giddiness or heridache, or by a general appearance of plethora accompanied by shortness of the neck. Discusse of the spiral cord a previous attack of apoplexy or confirmed epilepsy, render the life unin insurable. Previous attacks of other discusses of sunstroke, impair expectation in proportion to the amount of persisting danage. Sexual incapacity in mides is an early symptom in many neuroses. Knee-jerk and eye reflex should always be tested.

Circulatory system.—The pulse should be regular between (in adults sitting) 70 to 85 per minute, soft, but not too

<sup>1</sup> C Muirhead op cit, p. 97, etc

<sup>&</sup>lt;sup>2</sup> Pulse rate is often increased by nervousness of candidate during examination

compressible. Change of posture should not make a difference of more than 10 beats per minute. The heart sounds should be normal and the apex beat in the fifth intercostal space about 11 inches below and the same distance to the right of the left nipple If a murmur exists and there is reason to suppose it to be not due to organic disease postponement of the assurance should be advised. If due to valvular disease its intensity affords no indication of the amount of danger Certain forms of valvular disease damage expectation more than others Aortic regurentation is the most serious from liability to sudden death whilst gortic stenosis and mitral disease especially if regurgitant in character is much less serious Patty degeneration of the heart obviously greatly impairs expectation In the rheumatic class prognosis depends largely or in considerable degree on good compensation and absence of recurrence of attacks of rheumatism. Age is also important as acute rheumatism is more a disease of early lifeoccupation quiet and liabits regular. Agric regargitation should be rejected and also double mitral disease Generally cardiac diseases should be accepted only on careful considera tion and in certain selected cases otherwise a heavy addition should be made in a case of a would be insurer exhibiting functional disorder of the heart produced by excessive tea or coffee drinking or tobacco smoking and especially in regard to tea intoxication The subsequent cardiac irregularity might be so great in fact that any medical examiner must reject the candidate if afforded only one opportunity of examination A second examination should be obtained in two or three years time Tea acts on the acceleration of the heart without cloud ing the higher cerebral functions but in very varying degrees in different individuals. The chief symptoms of excessive tea drinking are found in the heart's action. The cardiac symptoms are (1) increased rapidity (2) intermittency and irregularity, amounting in extreme cases to delirium cordis. (3) pulse very irregular also and altered in volume and force and (4) no pericardial rub though sounds might be quite arbythmic These symptoms are due to ter alone and would disappear in two or three weeks if the tea-drinking were discontinued. The arregularity is of purely nervous origin at does not end in organic discuss of valves or affect the heart except possibly wa the direction of dilation of the cavities. The tea or coffee habit could be easily given up by most persons In the case of the tobacco habit the heart becomes irregular and irritable but the cardiac complications are removable by stoppage in this case also There are no interstitual depreciations of the heart as in the case of chronic alcoholism, the effects are transient and

call only for the relinquishing of the habit and they call for the postponement of the insurance examination

Digestive system -Under this head the appearance should be noted of the tongue lining membrane of the mouth skin and conjunctiva. Teeth -Loss of teeth renders the individual unsound by leading to dyspepsia and diarrhosa through want of proper mustication. In such cases the proposer should be made to get and use a set of artificial teeth before he can be considered sound Pyorrhæa alveolaris is very common in Indians and the life should be declined till the pyorrheea is cured Inquiry should be made as to the state of the appe tite and action of the lowels and as to present or previous existence of piles jaundice hæmatemesis chronic vomiting and symptoms of dyspepsia generally Inquiry should also be made as to previous attacks of malarious disease and an endeavour made to ascertain the condition of the spleen Enlargement of the liver (except when due to simple conges tion) renders complete rejection of the life advisable. If due to simple congestion the examination should be postponed until the liver has recovered its normal dimensions 1

Gente-urnary system —Œdema or puffiness especially of the eye lids hands feet or scrotum should be looked for, and inquiry made as to the existence of lumbar pains or dysuria Inquiry should also be made as to existence or otherwise in males of sexual incapacity and urethral stricture, and in females of symptoms indicating ovarian or uterine disease. The urnie should always be prissed in the presence of the examiner for substitution of urnie is a common trick with diabetes applicants. Its specific gravity should be 1015 to 1025 and it should be fine from blood sugar and albumen. Persistent presence of any of these readers the life uninsurable. The urnie should also be examined for the presence of bile pigments but tube casts and cristalline deposits.

Colour blindness—Special examination should be made for this in the case of sailors railway guards locomotive engine drivers or others whose occupitions are such as to expose them to danger should they mistake the colour of a signal. The form of the affection may be inability to distinguish red or green or violet constituting as the case may be red blindness green blindness or violet blindness. Of these three forms the first is most and the last least common Or the inability to distinguish these colours may be incomplete the most common form. Examination for colour blindness is best conducted by Holingrein such of the lather it est now preferred. This

consists in placing before the individual a number of skems of wool of various shades of colour, and making him sort them in order according to their colour and shade

# Other Questions.

Other questions which may arise in connection with Life Assurance are —Has there been misrepresentation or conceal ment of material facts? Has the death of the assured taken place? Did the assured kill himself? What was the cause of the assured as death?

#### HAS THERE BEEN MISREPRESENTATION OR CONCEALMENT OF MATERIAL FACTS?

This question arises when liability to pay the sum assured is disputed on the ground that the policy is road owing to such inisrepresentation or concealment

Identification of the proposer—If the proposer is previously unknown to the medical examiner he must be introduced by some one who vouches for his identity, and identification—marks should be noted.

Concealment of material facts—A material fact is anything the assurers have a right to be informed of which may influence the rate of premium irrespective of whether the party from whom the information is required does or does not know it may have this influence and irrespective of whether the fact is or is not a condition of things which has actually shortened the life of the assured

The question whether a given fact is material or not may be one on which expert evidence is not required \$\epsilon\$ previous rejection of the life by another assurance office. Frequently, however the first alleged to be material is the existence at the time of effecting the assurance of a particular high or disease or previous attrack of disease. Here the question whether the fact is material or not may depend on whether or no such that or disease is one which usually tends to shorten life and when this is the case the opinion of a medical expert may be required in order to enable the Court to decide the question at issue. The existence of disease, or of a previous attack of disease, may or may not be a material fact—It is a material fact is information regarding its existence has been specifically required by the assurers \(^2\). For exect of concealment of facts see Appendix

<sup>&</sup>lt;sup>1</sup> The questions regarding the present or provious existence of disease, put by assurance offices to an individual proposing to assure his life after specially mentioning various diseases usually conclude with the words "or any other disease or disorder lending to aborten his.

On this point it has been decided 1 that when the question is one of material concealment in life assurance only such diseases come within this description as are of a serious nature and the usual course of which is to shorten the duration of life existence of a habit such as usually tends to shorten the dura tion of life is obviously a material fact. Commonly there is no difficulty in answering the general question whether or no a particular habit comes within this description. In one important case however 2 the expert witnesses called at the trial differed greatly in opinion on the question whether or no opiumeating was a habit tending to shorten life. The same question has arisen in regard to vegetarianism and it is possible that it might also arise in regard to tobacco smoking. Where however, the habit is one which like the two last mentioned is not usually held to shorten life the question whether its existence is a material fact or not has been held to depend on whether or no specific inquiry as to its existence has been made by the assurers Considerable difficulty is sometimes met with in coming to a conclusion as to whether or no a particular habit existed at the time the assurance was effected. In the case for example, of alleged intemperate habits it is difficult to draw a line between moderate use and abuse of alcohol and often difficult, there fore to come to a conclusion as to whether what existed at the time of effecting the assurance was the latter or the former When however this is the question at issue the decision in the case usually rests on the ordinary evidence produced not on the expert evidence

To establish that there has been misrepresentation or concealment the existence at the time of effecting the assurance of the fact alleged to have been misrepresented or concealed must be proved. This is many cases is a matter of ordinary, not expert evidence. In other cases proof of the existence of the fact concealed rests in whole or in part on expert evidence, eg the assured may have endeavoured to conceal a previous attach of disease, by concealing the name of his usual medical attendant. Such cases usually present no difficulty. Cases more difficult to deal with rec (1) cases where the only evidence available of the existence of a disease tending to shorten life is evidence of the existence of earth symptoms which may or may not have been due to the disease in question, and (2) cases where the inference that a particular disease tending to shorten

<sup>&</sup>lt;sup>1</sup> Watson v Manuvaring see Taylor Med Jur II p 598 <sup>2</sup> The suit regarding payment of sums assured on the Earl of Mar s life (1831) The assured was an opium eater but this had not been made known to the assurance company (see Christison on Possons, p 716)

life existed at the time of effecting the assurance, rests on the rapidly fittal termination of the case from such disease. No general rules can be laul down for guidance in cases of this kind. In each case a medical witness must be guided by his knowledge of the symptoms and usual course of the disease alleged to have existed.

#### HAS THE DEATH OF THE ASSURED REALLY HAPPENED?

This question may in effect be one of identity, namely, Is this body that of the assured I or, in crists where no direct proof of death is obtainable, one of presumption of death. These two subjects have already been considered (see pp. 74, etc.) This question also arises occasionally in cases where, with the view of definiting an insurance compuny, in assured disappears, having first fabricated evidence of his own health

#### DID THE ASSURAD BILL HIMSELY?

Assurance policies almost always contain a clause exempting the company from liability should the assured "die by his own hands" or "commit suicide," or die by the hands of justice. In giving evidence at an inquest, therefore, it should be kept in mind that an opinion as to the cause of death, given at such inquest, may afterwards be called in question in an action to recover assurance money In such a case, omission to make a thorough examination of the body may place the witness in a very awkward position Again a question, which has more than once arisen in the course of actions of this kind is this The assured kills himself during an attack of insanity, is this "death by his own hands or 'suicide' as the case may be, according to the phrase used in the policy? On this question ie English judges have expressed different opinious It has, owever, been decided by a majority of the judges that these brases, as used in assurance policies, include all cases of itentional self-killing, no matter whether the individual be or be not meane at the time Though assurance policies sometimes contain a clause repudiating liability should the assured die, by his own hand, in actual spactice, almost all offices, pay unless there has been fraud Many insert a clause repudiating hisbility in case of suicide within a short period, usually one or tno years

#### WHAT WAS THE CAUSE OF THE ASSURED'S DEATH?

Obviously, when it is alleged that the assured killed himself, this question directly arises. So, also, this question may arise indirectly, in a case where it is alleged that there has been material concealment, seeing that the cause of death may afford corroborative evidence of the fact that there was such concealment. Further, the question, What was the cause of the assured's death? may arise in the following cases.

# Accident Assurance and other Compensation Claims for Accidental Injuries.

The legal definition of an 'accident' with reference to compensation of claims was established by Lord Macnaghten's ruling in 1903 (f'enton v Thorley d: Co, Ltd) as follows "The expression 'accident' is used in the popular and ordinary sense of the word as denoting an unlooked for mishap, or an untoward event which is not expected or designed"

Where the life is assured by an insurance policy against accident, the term 'accident' is deliberately restricted by the insurers, and is defined as 'any bodily injury caused by violent, accidental, external, and visible means, and resulting in death or disablement within three months of the accident,' and such restrictions, especially when serious illness or deformity or death follow an accident, although not the probable result of that accident, frequently lead to litigation, though reputable companies usually settle re-isonable claims. The following decisions' show the extensive range of happenings which have been ruled to come within the meaning of the terms of the insurance policies—

1856, 1870, 1880—Drowning especially when consequent upon an internal disease, cg epilepsy Trew v Railway Pass Ass Co , Reynolds v Accidental Ins Co , Vinspear v Accident Ins Co 1859—Spund injury from lifting weights Martin v Travellers' Ins

Co 1864 —Herma after fall, necessary operation, death Fitton v Acci

dental Death Ins Co
1881 -- Falling under railway engine during sudden illness (a fit)

Laurence v Accidental Ins. Co 1887 — Paring corns leads to fatal gangrene of leg Durham Spring Ass. (Cavef.) (1 unses, Jan 26)

1889—Shoulder dislocated, while lying up was restless, pneumonia contracted, death within a month Istit v Railway Passengers Ass Co

<sup>&</sup>lt;sup>1</sup> Cited by S B Atkinson, M A, B A, in Trans Med Leg Soc, II 13, 1904

1803 -Cartilage in knee joint dislocated while stooming Hamlun v Crown Assurance Co (Esber, MR "Unexpected result

"Something unforeseen and unexpected and casual )
1896 — Mental shock, without physical impact Pugh v London.

Brighton, and S C Raylic in 1903 —Scratch on leg, erysipola; in one week, septic pneumonia one week later, death one week later, Mardorf v Acculent Insurance Co (Wright J "Not an intervening cause")

On the other hand, the following were held to be not 'accidental'1 -

1861 - Sunstroke after exposure, death same day Sinclair v Mari time Passengers Assur Co

1870 -Wound in foot ervsipelas in five days, death on seventh day

from mury Smith v Accident Ins Co. 1885 - Fall, dislodgement and impaction of gall stone, death Camley v Nitional Employers' Accil Assur issoen

1889 - Poison swallowed, mistaken for medicine, death fooliev ex cluded such cases) Cole v Accident Insur Co.

1889 (Sc ) -Thrown from carriage Bright's disease aggravated. death Mchechase & Trustees , Scottinh Accident Co

1892 (Sc ) - Prolapse of hepatic flexure of colon in pulling on stock ing, fatal obstruction of bowel Cludero v Scottish Acrel Co

1896 (Sc ) -Germ infection from undisclosed source St Clair Gray v Northern level Ins Co

1904 -- Syncope after ejecting a drunken man Scarr v General Accs dent Assur Co See Prof Powell a Notes in App XI

For non fatal accidents, the foregoing lists supply useful andications as to the validity of compensation claims, and it has been ruled that even a predisposing infirmity may not vitiate the 'accident,' thus in 1900, hermin recurring in lifting frozen planks was held to be an 'accident' for workmen's compensation (Timmins v Leads Forge Co) Mental shock, also, has been compensated, as opposed to the more direct persons shock of an accident

Case -- Value of a leg -- The value of the loss of a leg by an agri cultural labourer through being knocked down and run over by a traction engine was assessed at the Reading Assizes by Mr Justice Lawrence and a Jury at £250 - Dail , Neus (Lond ), June 6, 1911

The insurance company, except by a previous special agreement, has no power to demand a necropsy upon the body of the assured (Ballantine v Employers Ass Co, 1893) nor can it claim to be represented at a personal medical examination, nor during a necessary surgical operation (Home Office direction in III Law Times, 296) The insurance companies often take a liberal view of the circumstances, thus in the case of a man murdered by a burglar, his death was treated as accidental

In fatal cases the question takes the form Was death due to accident or to natural causes?-the assurers being liable in the former case but not in the latter When the cause of death has been definitely ascertained, there is usually no difficulty in coming to a conclusion on this point, and as may be seen from the above list death from sunstroke does not come within the meaning of death from accident as used in such policies So also, there is usually no difficulty when death occurs within a short time after the alleged accident however, a considerable interval of time has elapsed between the accident and death difficulty may be experienced in coming to a decision on the question In such a case points for consideration are (1) Were the symptoms and post mortem annearances present in the case such as indicate the presence of disease? (2) Could such disease have arisen from the accident? (3) What influence would the accident be likely to exert on such disease? &c. &c

#### MEDICAL OBLIGATIONS

#### CHAPTER XXI

# MEDICAL RESPONSIBILITY, PATIENTS' SECRETS, AND MALPRAXIS.

"All physicians and surgeous acting unti-lfully in their several profes sions must pay for copury to brite animats the lowest, but for copury to human creatures the middle americanent (500 penss) "-MAD", transl by Jones, IV 281

Obligation of secrecy.—The ethical law of professional secrecy and honour continues to be much the same to-day as it was in the fifth century it or, in the time of Hippocrates, the 'Father of Medicane,' whose famous 'Oath'' was the parent of the 'declaration' which is still incumbent upon medical graduates of our universities, and upon licentiates and diplomates of most of the colleges. The legal obligations however, and the

1 The Oath of Hypocrates" runs thus -- I swear by Apollo the Physicist, by Askleptes by his daughters Hygera and Panacca, and by all the gods and goddesses, that to the best of my ability and judgment I will faithfully keep

this oath and obligation

this oath and obligation will be shown as my parents and shall be master that he can make my parents and shall be master that he can make my man and an and an and an another than the can desire the can be shall be treated by me to the best of my power and judgment in the best manner, without injury or violence. Neither will I be presided upon by any one to white them to the same art without appread my or propared Without injury or violence. Neither will I be presided upon by any one to administer noxious medicines nor will be the author of such advice myelf chantely, and reignosely I will not medid over the tilture of such advice myelf chastely, and reignosely I will not medid over this lithouthy leaving that it operators of that art. Whatever house I am called upon to attend, I will aim at making the patients' good my chef aim, avoiding all murpr, correption and unchastilty, and whatever I have in the course of my practice relating to the adjaces of the of my potential that ongle its creams excert soledly shell cer Amount this solemn outh and may the reverse be my lost I violate it and forswest myself."

\* Each medical graduate in the Scottish Universities must take this declaration "I do solemnly and sincerely declare that as a graduate in medicine in the University of ——, I will keep silence as to anything I have seen of heard while vanting the sick which it would be improper to

divulge "

modern craving for publicity, which, among other things, obtains the issue of bulletins signed by the medical attendants, with details of the illnesses of persons of position, have caused the old ethical code to undergo considerable alterations As a result, the medical man in daily practice has to publicly give away the secrets with which he has been entrusted, or suffer a legal penalty for not doing so Thus when subprenaed, and when giving evidence on oath, nothing can be concealed, unless self-incriminating, of which he has knowledge through his attendance on his patients Insurance companies also require from him the fullest details of the family medical history of patients desiring to be insured and to divulge matters which might be detrimental to his patient's chance of insurance. The State also obliges him in certain cases of infectious disease and sudden death to notify forthwith to a local authority, comprised of laymen, his opinion that such diseases are in existence, and were he to attempt to conceal such facts, he would incur a penalty, and be treated as a misdemeanant, notwithstanding that such notification might be detrimental to his patients He is compelled to give to the registrar certificates of deaths of his patients, and such documents are not treated by the authorities as confidential, but copies can be obtained by any one from the registrar on paying a small sum 1

Nevertheless, it has been ruled that 'secrecy is an essential condition of the contract between a medical man and his employers, and breach of secrecy affords a relevant ground for an action of damages (A B v CD, 14 Dunlop, 2nd S, 177) It is therefore well always to adhere to the rule of inviolate secreey as far as possible, and never to reveal anything, even the most trivial matters, without the patient's express consent; and so afford no ground for an action for damages for libel or otherwise Where, however the divulging of the secret is necessary to protect an innocent person from grave injury in a private or civil case, the conditions are different. On the other hand the ruling of Lord Mansfield (see p 16) has been set aside by so experienced a criminal judge as Sir Henry Hawkins, who ruled "that he could quite understand a case, especially in a civil cause, where a doctor was quite justified in refusing to divulge questions of professional secrecy (Kitson v Playfar.—Brit Med Jour, 1896, 799) Acting on this later ruling, the demand of the Court to divulge a professional secret was successfully resisted by a practitioner, a graduate of a Scottish University who had made the 'Scottish' form of declaration (see p 434)

<sup>1</sup> A G Bateman, M B, Trans Med Leg Soc, II 50 etc, 1904

Corr—Alleged Adultery—At Notis Bench of Justices in 1900 this act on was laid by a husband against his write who was lung apart from him by deed of separation. For including the continuous particles of the continuous con

Fren when the police surgeon or civil sur\_con has to camma a prisons for evidence of the crime on his or her person he should brist warn the prisoner that anything, found would have to be reported by him whother in favour or against and that he or she was legally cuttile to refuse permission to be cammed. In the evanimation of women the surgeon must be especially careful as already quoted at p 305. An assault has sometimes been illeged against the surgeon for his examining at the instance of the police or others a female alleged to be pregnant or the victim of rape. In such cases the consent of the party must invariably be first obtained by the surgeon in the piesence of witnesses whose names should be duly recorded in noting this fact in the report and the examination itself should be made in presence of these witnesses. Moreover, the surgeon in surgeon should not himself undress the female (see p. 305).

If a med cal man unnecessarily strip a female pat cut naked under the place that he cannot otherwise judge of her illness it is an assault if he himself takes off her clothes (R. v. Rosins! I. Mood C. C. 12)

In the case of a child the obligation to notify certain infectious diseases and sudden deaths under suspicious circiumstances is an important part of a practitioner's responsibility. In cases of attempted suicide, which is in law only a common midemeanour (p 100) it failed he would of course attend to the patient as long as he remains under his care but no legal obligation rests upon the practitioner to report to the authorities as the attimpt to commit suicide is by statute declared to be a misdemeanour and not a felony. If however, the patient dies he should acquirint the coroner or request the friends to do so. In regard to the crime of attempte I abortion it seems generally agreed that it is meyche lient for a medical man to go out of his way to give information to the police that a prittent of his to whom he was

called had been trying to procure her own abortion, but it is quite different when he ascertains that she has had the aid of a professional abortionist. But in all cases in telling such secrets as compelled by law to do, he should be careful to tell only the proper authority, and mark all letters containing such information 'private and confidential'

Obligation of skill.—Malpraxis is the want of reasonable skill and care on the pirt of the medical attendant, whereby the person under treatment sustains damage to health or life or limb. The 'skill demanded by the law is not of a high or specially expected from an ordinary duly qualified practitioner dough his best. Thus a practitioner who presented morphine for asthma, whereby his patient acquired the morphine habit, was said to have exercised 'reasonable' skill. Another practitioner who kept a Colles' fracture in a splint for several weeks, whereby adhesions of the extensor tendons occurred was also said to have exercised reasonable skill.

Case—Ordnary not emment skill to be expected (Gibbs v Tunalty)—It was ruled that the jury were not to expect the same amount of emment skill in a country practitioner as is to be met with in large towns, but they had a right to expect from him the usual and ordnary amount of skill care and attention which it was only reasonable to suppose he would possess, and if in the discharge of his duty, he applied his professional skill can knowledge to the best of his ability, then however unfortunate the determination of the case, he was not to be field responsible. The case was one for damages, but this reling would probably treatment could be shown to be not as good as might have been obtained elsewhere the person who caused the wound and not the medical man, would be fired responsible for the death "A orfolk Lert Assirtes 1846"

In the treatment of a case of criminal wounding the position of the surgeon in charge of the case is one of great responsibility, for if the wounded person dies, the surgeon may be blamed for his treatment. It may be alleged by the defence on the one hand, that any operation the surgeon may have done contributed to or caused the fatal result, or on the other hand that the death would not have occurred if a certain operation had been performed A similar question may also arise with reference to medical treatment and nursing What the law requires of a medical man in the treatment of a case is only that he will exhibit 'reasonable skill and care' An operation in a criminal wound case, or for producing justifiable aboution (see p 317), should never be undertaken except with the object of saving life, and before performing it another surgeon should, if possible, be consulted so as to share your responsibility Where this latter course is not possible, as in isolated country towns, the surgeon

should use his utmost skill, and this is all that the law requires of him

Deaths under chloroform, or other an esthetic administered for the purpose of performing an operation would be judged of in the same way, namely, 'was the anæsthetic necessary,' and 'was it administered with reasonable skill and care?'

In every case where an operation is performed, the consent of the patient or of his guardian if a minor or unconscious,

must first be obtained

In fractures and dislocations it is well to use the X-rays to prove that fination and reduction have been accomplished, or it not, the surgeon should have written proof that he surgested its employment to the patient, and was refused its aid. The skrigraph however, can mever form the basis upon which the shrigraph however, can mever form the basis upon which the amount of damages is assessed. That will depend, as formerly, upon the functional disability and loss which the patient lass sustained. Whenever a skiagraph is introduced as oridence, the defendant should demand the privilege of having a similar examination made, and should comploy expert testimony to fully explain its meaning to the jury.

The treatment followed should be of the recognized or established kind and no new form of treatment of the nature of an experiment should be practised without the consent of the

patient or guardian

The 'care' should be of such actively attentive kind as never to give reasonable excuse for a charge of neglect or carelessuess Cases have occurred of synhits and puerperal fewer having been conveyed by a surgeon through carelessness

Fees for abandoned operation,—A surgeon is entitled to claim his fees for an operation which, having begun, he deems it wiser not to complete

Case —The above ruling was made by a King s Bench jury in June 19 1919, in case of Wr Bot ring v Wrs Cook wherein a timour supposed to be a fibroid was found on mersion to be a sarcoma when the operating surgeon decided not to remove the tumour — The fic involved was £42

Responsibility of hospital authorities to patients.—A patient who has sustained injuries in the course of an operation performed upon him may sue the presiding surgion for damages and not the hospital authorities, also, it would seem, the medical student, nurse, or other attendant who in obeying the surgion's directions assisted in inflicting the injuries may be suiced.

Case —Hillyer t St. Bartholomew's Hospital [1909, 2 K. B 820] — W H Hillyer, a medical man, entered the hospital to be examined under

<sup>1</sup> Dr Luonard in Medical News February 25 1901

an ann sthetic. The examination was conducted by a consulting surgeon of the hospital on an operating table. His left arm came in contact with a bot water tin projecting undermeath the table, burning the upper arm, and the right arm was said to be brused by some person pressing against id during the operation. The result was traumatic neutrits and paralysis of both arms. The examination was undertaken gratuitously. The hospital authorities were held not to be lable for negligence when the nurses and other servants were acting under the orders of the surgical and incident staff.

Continuance of attendance.—Even in ordinary civil practice it is necessary for the practitioner at times to protect himself against possible charges of neglect made by an unreasonable patient or his friends, when the surgion has been called in casually to see the case, and his not been definitely asked to continue to attend it. It is well, therefore, in such instances, to take the precaution of getting such people to record definitely in writing whether they desure him to attend the case or not. Once he undertake, to attend the case, he is bound to continue his visits as long and as frequently as the requirements of the case may demand, and he is held to determine when his visits may safely be discontinued, though he is always at liberty to discontinue his attendance at any time by giving reasonable notice of his intention to do so

#### PART II

# POISONING OR TOXICOLOGY

# CHAPTER XXII

### POISONS IN THEIR GENERAL ASPECTS.

Poisonno with its secret treachery, his from early times been especially recribed to the East as the favourite means employed by assassins to remove objectionable persons and take hife, and certually at the present day poisoning is very much more common in India and the Last thru in Europe

Poisons were doubtless early discovered by primitive man, who by experience or accident must soon have learned to avoid them himself and to use them against his enemies or game, for nearly all savage tribes use poisoned arrows Indeed, the classic term Toxicology is derived from the Greek word for 'an arrow or missile for the bow, which would indicate that the earlier use of poison in Eastern Europe was to smear over arrows for slaving The modern word poison comes from the Latin poto, to drink as signifying the more modern mode of administering a poison, namely, as a 'potion or draught. The Indian term Bish is from the Sanskrit root to permeate or periade' and denotes the intruding, alien and diffusive nature of poison ancient Indian scriptures contain references to the poisoning of Lings, the doings of professional poisoners and of widespread organized poisoning in almost prehistoric times. In one of the Shastras translated by Dr Wise 1 it is written necessary for the practitioner to have a knowledge of the symptoms of the different poisons and their antidotes, as the enemies of the king bad women and ungrateful servants, mix poison with food" Susrnia the Indian Hippocrates, describes the several modes of poisoning in ancient India, how the

poisons are mixed with food or drink, honey, medicine, bath ing water, anointing oils, perfumes eyelash pigmonts, snuff, or sprinkled over clothes, beds, couches, shoes, garlands and jewellery, saddles of horses, etc., how poisonous draughts are prescribed as love charms, also the secret poisoning of wells and other drinking water to destroy enemies

The Mahabharat, which is usually ascribed to the 5th or 6th century in C, mentions that Bhim Sen, the Hindia Samson, was poisoned by his cousin Durjodhan in revenge for being defeated by him in a duel in a semi historical legend of mid India it is related that the grandfather of Acoka, Chandra Gupta, a contemporary of Alexander the Great, sent to the latter monarch in the guise of a present, a fascinating girl who was a 'poison maiden' fed on poison until she was so saturated with venom that her embrace would prove fatal to an ordinary mortal—the mere conception of the idea of such a Borgia-like strem would imply considerable familiarity with poisoning

Strabo relates that the custom of burning Hindu widows alive on the death of their husbands (sat) was introduced as a check against the prevailing custom of Hindu wives poisoning their husbands so that the wives would thus hive an interest in not being privy to the premature death of their

lords

In Mohammedan times, poisoning was a recognized form of capital punishment, and was unusually rife in harem intrigues

and against political foes and prisoners

Many Indians consider the tiking of life by bloodshed a grader crime than posoning strangling etc. Note the use of the word "Khun, 'Iteraily 'blood,' as a synonym for "murder." A medical witness may be puzzled by the per sistence with which an Indian juryman will cross examine to know if there was any blood spilled on the clothes, etc. If no blood is shed, in their opinion, the manslaughter does not amount to murder, and the punishment should be less

For magical and mystic purposes without intent to actually kill a good deal of what may be called 'accidental' poisoning

goes on in the country districts, see pp 29 et seq

This is mostly procused here, as sleewhere, by jealous women or desperate lovers of either sex for the purpose of captivating affection or of infatuating and enthralling the object of desire But it is also used for baneful purposes to cause dississe, death, or some strange aberration, and whether employed by love or by hate it has certainly always been intimately connected with some real knowledge of medicine and has veiled a great deal of downright poisoning <sup>2</sup>

Mudra-rakshasa in Wilson s Hindu Theatre Chevers Aled Jur, p 105

Definition.—It is not easy to define the term 'poison' it is not enough to define it as 'any substance whenle on being absorbed into the body injures health or destroys life' Becurse (1) certain substances harmless in small does are capable of causing death when absorbed into the system in large doese although not usually considered poisons, or common salt and sulphite of potash in sufficiently large quantities, (2) the towns of discuss, though capable of causing death, are not considered 'poisons in the ordinary scine of the word (3) certain substances may cause injury or death by local action without absorption into the system e g corrovice acids and neclamical irritants. The definition, therefore, should include, in addition to 'nay substance absorbed into the body, also 'any substance which by chemical action on the tissues injures health or destroys life.

For legal purposes in India, however, the exact definition of a 'poison' is not essential, because the law usually paraphrases in explanatory form its reference to 'poison' Thue in the causing of 'hurt' and 'grievous hurt' by poison, ss 324 and 326. IPC state 'Any poison or any corrosive substance," or "any substance which it is deleterious to the human body to inhale to swallow, or to take into the blood.' Hence, for conviction under these sections, it is not necessary to establish that the substance by means of which the hurt or grevious hurt was caused is a poison, it is sufficient if it be proved that it is a substance which comes under the above stated description. Again s 299 declares "Whoever causes death by doing an act with the intention of causing death or with the intention of causing such bodily injury as is likely to cause death or with the knowledge that he is likely by such act to cause death, commits the offence of homicide" Hence, if A administers a substance to B, with such intent or knowledge, and thereby cause Bs death A may be convicted under this section of the offence of committing culpable homicide, irrespective of whether the silistance administered may or may not strictly be called a poison For it is the intent which suffices to constitute an crime irrespective of the do e or even the nature of the sub struce In s 328 is "Whoever administers to, or causes to be taken by any person, any poison or any stupelying, intoxicating, or unwholesome drug or other thing with intent to cause hurt to such person, or with intent to commit, or to facilitate the commission of an offine, or knowing it to be likely that he will thereby cause burt, shall be punished with imprisonment of either de-cipition for a term which may extend to ten year and shall also be liable to fine." Here, again, it will be observed that the addition of the words "any stupefying, intoxicating

or unwholesome drug or other thing," render the exact definition of the term 'a poison' unnecessary for the purposes of this section. It should, however, be noted that the words "or other thing" must be read other unwholesome thing." Hence, administering a substance as to whose nature no evidence was given, which was intended to act as a charm was held to be no offence (R v Jotee Ghorace, I Suth Cr., 7)." The question of a definition of the exact meaning of 'poisonous substance' might arise in the case of a person charged under s. 284 of the Penal Code with the offence of 'knowingly or negligently' omitting to take such order with any poisonous substance in his possession as is sufficient to guard against probable danger to human life from such poisonous substance substance.

Restriction on sale of poisons.—In India with the exception of Bombay Presidency, there is practically no restriction on the sale of poisons, other than a partial one on white arsenic, and this accounts doubtless in considerable degree for the excessive prevalence of poisoning in India There was no restriction whatever on the sale of poisons, except in Bombay notwithstanding the repeated representations by myself and other chemical examiners up till 1899, when the White Arsenic Act (of 1899) was passed but regulations as to the possession and sale of the white arsenic are limited to such local areas as local Governments may direct the result being that arsenic may still be readily obtained in large quantities in an ordinary bannia's shop in most bizaars with practically no restrictions On poisons other than arsenic there is no restriction whatever except in Bombay, which in its Sale of Poisons Act incorporates the provisions of the English Arsenic Act (14 Vict cap 13)

The Sale of Poisons Act (Bombay Act VIII of 1866) The chefe provisions of this Act are that cirtain poisons animal in Schedule A of the Act (1) may only be sold by licensed vendors (s 3), (2) (except when dispensed as medienne on the order or prescription of a practitioner of medienne) may only be retailed to persons known to the vendor, or in presence of a witness known to the vendor and to whom the purchaser is also known, and each sale must be entered with the purchaser is also known, and each sale must be entered with the purchaser is name and address in a book kept for the purpose (ss 13, 14 and 19), and (3) pounded white arsenic (except in special cases) may only be seld mixed with soot in the proportion of one ounce to each pound of arsenic or with indigo or Prussian/blue in the proportion of half an ounce to each pound of arsenic or with indigo or Prussian/blue in the proportion of half an ounce to each pound of arsenic or with indigo or Prussian/blue in the proportion of half an ounce to each pound of arsenic or with indigo or Prussian/blue in the proportion of half an ounce to each pound of arsenic or with indigo or Prussian/blue in the proportion of half an ounce to each pound of arsenic or with indigo or Prussian/blue in the proportion of half an ounce to each pound of arsenic or with indigo or Prussian/blue in the proportion of half an ounce to each pound of arsenic or with indigo or Prussian/blue in the proportion of half and ounce to each pound of arsenic or with indigo or Prussian/blue in the proportion of half and ounce to each pound of arsenic or with indigo or Prussian/blue in the proportion of half and ounce to each pound of arsenic or with indigo or Prussian/blue in the proportion of half and ounce to each pound of arsenic or with indigo or Prussian/blue in the proportion of half and ounce to each pound of arsenic or with indigo or Prussian blue in the proportion of half and ounce to each pound of arsenic or with indigo or Prussian blue in the proportion of half and the proportion of half a

to, with their vernacular names, as follows "1 Vegetable poisons --- Aconite (bolchrag) cocculus indicus (kakmarı, lakphul) datura (datura), henbane (khorasanu ajwau) nux vomica (kuchila and kapia) Saint Ignatius' bean (papita), and Calabar bean 2 Mineral poisons - White arsenic (phull ya somul somul) red arsenic or realgar (mansil), yellow arsenic or orpiment (hurtal) Scheele's green or arsenite of copper, and Schweinfurth green or aceto arsenite of copper (I hirwa) and corrosive sublimate (rus/apur)' For Bengal provision has been made to guard against the ignorant compounding of Furopean drugs by unqualified druggists (Beng Mun Act, s 252), but no restriction is placed on the indiscriminate sale of indicenous poisons in the bazaar, which is much the greater evil What is needed is a Bill for all India somewhat similar to the poison schedule of the Fuglish Pharmacy Act (31 & 32 Vict 21) as is in force in the Bombay Presidency In Government dispensaries the rules for the custody and dispens ing of porsonous drugs prescribe that the labels of poisons be printed on vellow paper with the word 'poison in English and vernacular affixed to all bottles, and that a copy of the rules, pasted on paper or board, is to be suspended in every apartment where poisons are dispensed

The need for legal restrictions even in the large cities, is shown by the following recent case

Cate — Accidental poucoung through carelessness — In 1901 a Mr Hicks at Galcutta was taken all with dysentery and was advased to take a vegetable compound known as: \$Supar Laphul This drug was obtained from the grocery of lism hath Dass but with it was a large quantity of acouste which is a deadly poison. This was administered unwittingly to Mr Hick a who succembed to the efficies. It was un possible to tail from the contents of the stomach what quantity of better than the contents of the stomach who quantity do be prosecrated on a charge of doing a rata set by conting to take due care in the sale of a possonous drug. The accuse I raised the plea that the sale was actually effected by his sasistant and that he was not responsible for the acts of his servant. The Court held a contrary view moreover the accused was found quity of gross neglect by not convicted and set 2505, I P C and sentenced to three months regions convicted and set 2505, I P C and sentenced to three months regions

It is not yet possible to get any precise estimate of the prevalence of poisoning in India as a whole, for no systematic attempt is made to record this information in official strustics. An estimate is only to be formed approximately by piecing together the figures in the virious provincial police and sanitary returns with those of the chemical examiners. The police roturns only fifer to reported cases of eximin it poisoning, and the sanitary only to reported fatal cases, and the chemical

evammers return is simply the record of the results of analyses in the small proportion of cases in which viscera and comit and

other suspected matters are sent for analysis

For Bengal the statistics such as they are have been collated by Drs J F Fvnns and C L Bose 1 for comparative jurposes for the two quinquennil periods 1876 to 1880 and 1889 to 1893 with the following results Murder by poison—During the five years 1876 to 1880 94 cases of murder by poison in Bengal were reported by the police and during the five years 1889 to 1893 81 cases or an average of 0.31 and 0.23 per million of the population respectively, as compared with an average of 12 cases in England 0.07 per million of the population for the years 1876 to 1880 which shows that in Bengal murder by poison is more than four and over three times respectively the rate for England In these cases the evidence of murder was usually if not in all established by the chemical analysis

Suicide by poison -During the five years 1876 to 1880 11 662 suicides or 38 8 per million of the population were reported by the Sanitary Commissioner for Bengal and during 1889 to 1893 1.743 or 40 8 per million. As the number of suicides in all England and Wales in the year gives 60 2 per million the reported suicides in In ha are less relatively but there is every reason to believe that a large number are never reported No returns for Bengal however show what proportion of these suicides is due to poisoning For Calcutta city however, the statistics are more complete and these give for the years 1876 80 126 cases and for the years 1889 93 236 cases, or an average of 36 42 and 68 84 per million respectively (registration is more accurate of late years) as against an average of only 3 55 per million in England for the years 1876 80 And of the total cases of suicide in Calcutta 55 8 per cent were due to poison as against 12 25 in England showing that suicide by poison is about nineteen times more prevalent in Calcutta than amongst the general population of England The conditions of life in a city are lilely to make suicide more prevalent than in rural areas. Accidental fatal poisoning -There are no statistics available for the province but for the town of Calcutta there were respectively 14 and 11 such deaths reported during these two periods or a rate of 6.5 and 36 per million excluding snake bite as compared with 5 15 per million per annum for England during 1876 80 very large number of such deaths are believed to pass unreported especially in the practice of ignorant quack native medical

<sup>&</sup>lt;sup>1</sup> Trans Ind Medl Congress 1891

practitioners Non fatal cases of porconing -There are no provincial statistics for these except for the reported criminal cases by the police These are mostly cases in which datura er other stupefying drugs are given for the purposes of theft There were 161 such cases in 1889-93 reported or 0.4b per million of the population The Calcutta hospitals in 1898 treated 127 non tatal cases

The special poisons usually selected for homicide and suicide in India are very few in number, consisting chiefly of arsonic opinin and a few indigenous substances (alkaloids and European poleons are only used in a few cases in cities), and each poison has by long established custom come to be used for a particular class of crime Thus -

ABSECTS chiefly used in about half of the Aconite comes next For homicide \ux vomice Mercury copper antimony (Opium for murder of children and drunken OFFUN chiefly-about three fifths of total cases For sureida in Lengal Arsenic about one fifth of the cases. For stupefying for robbery of faturty (not Datura. necessarily with in Indian hemn tent to murder) Plumbago rosca Oleander Calotropas sp

For abortion

Accidental

Snake poison aconite mercury arsenie medicines The relative frequency with which particular poisons are used in fatal cases may to some extent be estimated from the reports of the chemical examiners on the results of their analysis of human viscera in poisoning cases. The two poisons most frequently used in India to take human life are arsenic and Arsenic is especially used for homicide (and also cattle poison) whilst opium is the special favourite for suicide, occasionally 1, 18 used for homicide in case of young children or drunken persons The next most frequent poison is datura used for stupefying people to facilitate robbery Others less

Colocynth

Mineral -(a) Copper -- Cases of poisoning ly compounds of this metal sometimes arise accidentally from contamination of food by the copper cooking vessels largely employed in India, occasionally however cases of attempt at homicide by the

administration of sulphate of copper are met with (b) Lead—Chronic poisoning by lead common in England is rare in India Red lead however is tolerably frequently met with in India as an ingredient of local applications employed to procure abortion (c) Mercury—Cases of chronic mercurial poisoning arising from milpraxis although not met with so often now as formerly are still occasionally seen—Occasionally also rusk-upoor or calonnel containing a variable percenting of corrosive sublimate—is criminally employed—(d) Pounded glass—This is popularly believed in India to be a powerful poison and is occasionally mixed with food with homicald intent

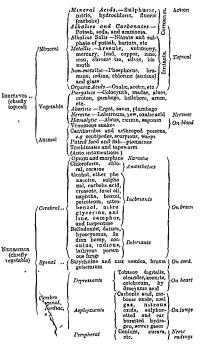
Vegetable—Next to opium and datura the vegetable possess most frequently used for homicidal and suicidal purposes are acounto deander (or nerium odorum and cerbera thevetta) nuv vonica (and its alkaloid strychini) and various euphorbris Of these acounte and strychinia five also given rise occasionally to accidental cases notably the first from its use as a fortifying agent for alcaholic liquor and the second from its use as a fortifying posson. The seeds of cerbera thevetra are sometimes used as a cattle poison and the milky juice of the milk bush and other emphorbris as an ingredient in irritant preparations employed as local applications plumbago roses and occasionally various cucurbitaceous tubers are internally administered for the purpose of procuring abortion. Madar (calotropis processa) and to be used for purposes of inatutede and in some parts of Indri a paste made from the seeds of abrus pie calorius is used by subcutaneous insertion for the purpose of destroying cattle

# Classification of Poisons

Poisons may be classified according to their action as on the opposite page

- I Irritant poisons, or such as possess a marked local ritiatian action exciting irritation and inflammation and when swallowed cuse vomiting and us a rule also purging A few of these when concentrated act as 'corrosives' is cause chemical destruction of the tissues. Foreign bodies is powdered glass stones of fruits etc act in this way
- 2 Neurotic are poisons such as have a specified action on the nervous system brain or spinal cord (1) Cerebral poisons or such as act mainly on the brain causing delirum or narcotism and tending to death by comi (2) Spinal poisons or such as act chiefly on the spinal system crusing either tetame spasm or local anresthesia or hyperæsthesia or paralysis,

#### POISONS IN GENERAL.



and tend, as a rule, to cause death by asphyxia, from spasm or paralysis of the respiratory muscles. (3) Gerebro-spinal acting of both systems. (4) Cardiac poisons, or such as act mainly

on the heart and tend to cause death by syncope,

Many poisons possess more than one of the above described actions, and may therefore be classed in more than one of the above groups. Thus, some poisons possess both a marked local irritant action, and a specified remote action on the nervous system, and may be called 'neuro-irritants,' and such of these irritants that act on the brain may be called 'narcotico-irritants,' e.g. aconite. Some neurotic poisons, again, have a marked action on both the brain and spinal system, or on both the brain and the heart, and hence arise the terms cerebro-spinal and cerebro-cardiac poisons

# Action of Poisons.

A poison may produce its effects by being administered by the mouth, into the lungs, absorbed through the skin, injected into a wound, or introduced into the rectum, or vagina, or ear. A good many cases of fatal poisoning nowadays occur from intravenous administration of salvarsan, antimony tartrate, etc., and many from intrathecal injection of stovain, novocain, etc., in spinal anæsthesia.

The action of a poison may be (1) local, or (2) remote, and the same poison may possess both a local and a remote action.

Local action of a poison results from its direct application to the part and may consist in the production of (a) Corrosion, i.e. chemical destruction, as in the case of the strong mineral acids; (b) Irritation and inflammation, as in the case of cantharitate metic, etc; or (c) Certain nervous impressions, as in the case of opinin, aconite, cocaine, etc.

Remote action of a poison may be of a non-specific or specific character. Non-specific—Poisons which possess a remote non-specific action on the system, producing thereby an effect similar to that which often results from severe mechanical injury. Extensive corrosion produced by a corrosive acid may, for example, be followed by shock, as a remote non-specific action. Specific.—This may consist in the production of tetanic spasm, as in poisoning by strychnine; syncope, as in poisoning by tobacco; nephritis, as in poisoning by canthardes; gastritis, as in poisoning by arsenic, etc., etc. The remote specific action of a poison results from the absorption of the poison into the system through the blood. Absorption takes place with extreme rapidity. Blake, from his experiments, inferred that a poison might be diffused through the whole body in nine seconds;

and Ericksen, in a case of extroversion of the bladder, found potassium ferrocyanide in the unne one minute after it had been given by the mouth on an empty stomach. As porsons are absorbed into the system through the blood, it indicates the advisability, in the case of poisoned wounds of applying a ligature above the wounded part, and endeavouring to remove the potent from the wound part, and endeavouring to remove the potent from the wound, as except on and suction. Again, it indicates that after death, absorbed poisons will probably be found, in greatest quantity, in organs containing much blood, or the liver.

In some cases the remote action may be the result of 'sympathy,'
that is of impression conveyed to the nerve-centres by the nerve-, as
where bardrograms and kills in two seconds

# Causes modifying the action of a poison These are -

- Quantity.—The administration of a large dose of some poisons is sometimes followed by symptoms differing greatly in character from those which follow a moderate dose, e.g. moderate doses of arsenic produce irritant symptoms, very large doses sometimes cause death by shock without irritant symptoms (see Cutse (3) p 486)
- 2 Form—(1) Physical Tousons act most rapidly when gaseous, next when liquid, next if in fine powder, and least rapidly when in solid masses (see p. 489). (2) Chemical This may render an active poison inert, e.g. corrosive acids may be rendered mert by combination with alk'hies, or (b)'nt may render the poison more soluble, increase the rapidity with which it acts or by rendering it less soluble, diminish the rapidity of its action.
- 3 Mechanical mixture with mert substances, eg dilution or mixture with mert powders, in some cases may alter the character of the symptoms, for example, corrosive acids when diluted, act as irritants only. In other case, mechanical mixture with an inert substance, by protecting the poison from absorption, may delay its action, hence porsons, as a rule, act less rapidly when given on a full stomach. Agun, animal charcoal, by taking up a poisonous alkaloid and rendering it misoluble by adhesion my delay or prevent its action.
- 4. Mode of application.—This by affecting rapidity of absorption, affects the rapidity of action of poisons. Modes of introduction enmorated in order of rapidity of action, the most rapid first, are (1) injection into a vein, (2) application to a wound, (3) application to a serous surface, (4) application to the brough tracked invoices membrine, (5) introduction into

the stomach; (6) injection into the rectum, and (7) application to the unbroken skin

5. Condition of body.-(1) Habit.-This, in the case of many poisons, eq opium, alcohol, and tobacco, tends to confer on the system a resisting power to the action of the poison to the use of which the individual is habituated (2) Idiosyncrasy. -This may show itself either in abnormal sensitiveness (or the reverse) to the action of a particular poison-eg. mercury; or the individual may be exceptionally effected by a drug, eg. purged by opium, or by an article of food (see fish-poisoning) (3) Disease -This, if the symptoms of the disease resemble those produced by the poison, tends to confer increased sensitiveness to the action of the poison eq. narcotics in advanced renal disease If, on the other hand, the symptoms of the disease are opposed in character to those produced by the poison. diminished sensitiveness to the action of the poison may be the result: e.g narcotics in tetanus. (4) Sleep and intoxication.— These may delay the action of a porson (see Cases, p. 486). (5) Accumulation -Small doses of a poison, each insufficient to cause any serious effect, if given one after the other at short intervals, may accumulate in the system and produce serious effects. Accumulation obviously tends to occur when the rate of elimination of the poison is slower than the rate of its administration Hence poisons which are only slowly eliminated from the body-e.q lead and mercury, and metallic poisons generally-are specially prone to act as cumulative poisons Organic poisons are, as a rule, quickly eliminated. In some, however-eg. strychnine-the rate of elimination is comparatively slow, and accumulation tends to occur

# Treatment of Poisoning.

As immediate treatment is so essential, it is advisable to keep an emergency case in readiness for cases of poisoning.

The indications of treatment in cases of poisoning are —(1) Elimination, (2) Prevention of action, and (3) Counteraction and removal of effects.

1. Elimination.—The measures to be adopted for the purpose of procuring elimination of a poison vary with the mode in which the poison has been administered. Thus, if the poison has been injected into a wound, excision of the wounded part and suction are indicated. If the poison has been inhaled into the lungs, the patient must be made to inhale pure an, so that the poison may thereby be chased out of the lungs. If the poison has been taken into the stomach, (1) the

stometh pump should be used except in case of correave poisoning care being taken to inject warm where lefore proceeding to exhaust and always remove a little less than the quantity injected the stomach pump (or out robber esthetic in young children) should always be used without delay in serious cases [22] where the stomach pump is not available and in milder cases and especially in children promotic vomiting by the administration of warm water or set up by tickling the fances or much letter by the administration of ometics e.g. mustard and water (one table-quonful of mustard to hilf a pint of water for in adult—this has no depressant action at the time or after) or 20 to 30 grain doses of sulphate of zinc or powdered specicualny or subcutaneous injection of one tinh to one fifth of a grain of apomorphine Or special treatment may be necessary for the elimination of absorbed poisons e.g. the administration of potassium iodide in cases of poisonner by leaf.

- 2 Prevent action or absorption -The nature of the measures by which this is carried out varies with the roison thus -(1) when the poison is not corrosive or mechanical in action prevent absorption (a) by the administration of sub struces to lender the poison insoluble by antidotes (see list in Appen lix) eg albumen in cases of poisoning by corrosive sul limate freshly prepared hydrated terric on le in cases of porsoning by arsenic sulphates in cases of poisoning by lead etc etc or destroy the porson ag cauterre poisoned wounds or (b) by mechanical means eg ai ply a ligiture above the wounded part in cases of poisoned wounds (2) In corrosion of destruction of the tissues administer antid tes to prevent the action of the poison by entering into chemical coml motion with it, eg the alministration of alkalies in cases of poisoning by the corrosive acids (3) Where acting mechani cally only it is in some cases possible to prevent its action by the administration of matters which will mechanically protect the tissues from the acti n of the substance swallowed eq the administration of bulky food in cases where pounded glass has been taken
- 3 Counteract and remove effects—In some cases of prosoning this may be done by administering physiological anti-dotes or substances which exert an action on the system opposed to thit of the poison eg atropine in poisoning by optium (see list of anti-dotes in Appendix). In other cases this indication is carried out by virious measures calculated to counteract or remove the effects of the poison eg the use of cold affusion and galvanism in narcotic poisoning, of warmth

to the surface, stimulants, and the recumbent posture in cardiac poisoning; of artificial respiration in cases where the poison taken is one which, like opium and conium, tends to cause death by paralysing the respiratory movements (Schæfer's or other system [p 236] should be kept up for several hours), of demulcents in irritant poisoning, etc., etc. Special measures for eliminating the absorbed poison, already referred to under 'Elimination,' may also be included under the head of measures directed to the removal of the effects of the poison

## Evidence of Poisoning.

The evidence pointing to the administration of poison may be derived from (1) The symptoms, (2) The post mortem appearances, (3) Chemical analysis, and (4) Experiments on animals

#### 1 THE SYMPTOMS MAY BE GENERAL OF SPECIAL

General.—1 Sudden onset —This character, however, may be absent in a case of poisoning, eg, in chronic poisoning by lead, mercury, phosphorus, etc., and may be present in cases not due to poisoning, eg apoplexy, cholera, etc. 2 Increase in seventry.—This character, like the last, is often present in disease Again in some cases of poisoning this character is absent, eg in the remittent form of opium poisoning (see Case below), and in cases where small doses of a poison are administered at short intervals

Case —Remittent opum possoning —"This lady swallowed, while fasting, an ounce and a half of laudanum by mistake In a quarter of an hour emetics were given, but she did not vomit for half an hour, and she was not trated medically for two hours and a half. The matter then drawn from the stomach had no sincel of laudanum. She was quite unconscious, and had lost the power of swallowing. After remaining in this comatione state for upwards of nine hours the patient review, her face became natural, the pulse stendy, the power of swallowing returned, she she was able to recognize her daughters, and in a thick voice to give an account of the mistake she had made. This state lasted about five minutes, the torpor then returned, she sgan sank not profound coma, and dusk in fortices hours after the passon had been taken.'—Taylox, Potsona, p 565, case of the Hom Mrs. Anson

3 Uniformity, i.e with the known effects of a particular poison, hence gastritis followed by salivation, as in acute increurial poisoning or by paralysis, as in aresincial poisoning, do not form exceptions to this rule 4 Begin soon after taking food, drink, or medicine—This character may be absent owing to the symptoms of poisoning being delayed in their appearance

by sleep, or by intorication (see Gases a, b and d, p 489); or by the counter active effects of another poison simultaneously administered. Or again this character may be absent, owing to the nature of the poison swillowed; for example, sparingly soluble lead saits only give rise to neute, symptoms after an interval of several hours, and a similar interval is often noticed in cases of fish poisoning. This character also may be present in cases not due to poison, eg cholers, apoplevy, etc., may come on soon after a meal, or rupture of the stourach may occur, and symptoms closely resembling those of poisoning have appeared from swillowing after exertion, a quantity of cold fluid (see two following cases)

Case—Sudden death from awallowing, while heated, a quantity of cold fluid—A young man having just sat down panting and lathed in sweat, after a severe match of tennis, druk greedily from a patcher of water fixal druwn from a neighbouring pump. Suddenly he had he hand on his stomach bent forward became pale, breathed laboriously, and na few muniter extruet —Christison, J. zeroza. 19 (2007).

Gize—Another—D-ath on the fifth dax—A soldier after a hurried pourney on a hot day, as allowed a quantity of sced beer. Six hours afterwards shivering set in followed by vomiting, anxiety, thirst, and frequency of the pulse. This was followed by great prostration, hiscorogal, and histiative of face. Dath took place on the fifth day. On post mortime craimin tion, the mucous membrane if the storaged was founded to the day of the craiming of the storaged by the control of the control

5 Other individuals are affected who partook of the same food, etc. This is a very striking character, it may, however, be present in discuse eg where, as sometimes happens, several persons after partoking of a meal together are nearly simultaneously atticked by cholera. This character may be apparently abount in a case of pusoning eg where (as in Case below), of several persons present at a meri, only one partakes of a particular dish. Poisoning also may be indicated by the fact that several persons have suffered from surpicious symptoms, after partshing of articles of food etc, which have passed through the hunds of one and the same individual, although the attacks occurred at different places, and at different times (see Case, p 475)

One—One only of a number killed by poson—In a case which cocurred in Proon a vigan was reported to have died six or seven hours after partaking of foodyt a feast with about one hundred and it enty five other preson. No complaint was made by his relations and the body was buried Some dary afterwards, an anonymous writing was found ontsite it the Magistrate's Court, sixting that deceased had been proteened, and an inquiry was ordeed. It then turned out that deceased had of a different casts to the other persons present at the feast was served of a different casts to the other persons present at the feast was served.

with food separately from the rest by a separate person, and that before death he suffered from symptoms of untuant poisoning. The body was then (eleven days after death) exhumed, and the viscers forwarded for analysis, when about twenty gains of arsenous oxide was found in the contents of deceased a stomach—Bombay Chemical Analyser's Report, 1890-81

Case — Homerdal poisoning by colchicum — Catherine Wilson was tried and convicted of the murder of a Wrs Scanies, who are years previously had died suddenly while being ninsed by her. It was proved that, demanded the control of the collection of collection of the

'6. Appear in persons previously in good health—This character may obviously be absent in cases of poisoning, or present in cases of disease 7 Prove rapidly fatal—This character, like the last, is one which may be absent in poisoning and present in disease

Obviously the greater the number of the above characters present in the same case, the stronger is the suspicion of poisoning; and rice tersa, the smaller the number, the weaker the indication of poisoning

Special symptoms of poisoning vary with the class to which the poison belongs

- 1 Irritant poisons, see p 465, etc—Certain diseases are accompanied by symptoms more or less resembling in special character those of poisoning, eg. The chief affections simulating the effects of poisons of this class, are
- (a) Cholera.—This is specially liable to be mistaken for arsenical poisoning, and the versa (see Alsenic, p 487).
  (b) Gastritis, following the imbitation of a large quantity of cold fluid, whilst the body is cooling after violent evertion (see Gase, p 454) Or, under such circumstruces, death may occur from shock (see Gase, p, 454), and the case resemble one of rapidly fatal narcotic poisoning, eg by hydrocyanic acid Idiopathic gastritis is very rare, and is not accompanied by the violent purging usually present in irritant posoning (c) Rupture of stomach, complete or partial, especially when

due to over-distension (see Case below) may closely simulate irritant poisoning. So also may perforation of the stomach from disease rupture or perforation of the intestines and rupture of the bihary ducts, therms or uterine appendages. In cases such as these the post morten appearances will indicate to what the symptoms have been due. (d) Colic.—There may be some difficulty in diagnosing this from acute irritant poisoning, especially by lead salts. Pressure however in cuite irritant poisoning augments the pain while in colic it often relieves it (e) Enteritis peritonitis and intussusception—These affections, like acute poisoning by lead salts are accompanied by constipation. Unlike irritant poisoning in the later stages of these affections vomiting if pre-cit becomes strengisecome.

- Case—Rupture of the stomach, symptons like irritant poisoning—A box aged fourteen after eating and drinking hearth) at feast was attacked with rodent vomiting and purping. Next morning be was unable to swallow his pulse because irregular and pressure on the heart or stomach caused extructating a, ony. These symptoms continued, and on the following day after having comitined at internal altogether about two pounds of blood the boy died. On post involven examination the inner coal of the stomach was found from in many places, and that of the duodenum lacerated almost completely round.—Tavlor, Pounces p 118
- 2 Cerebral ponons (see Chap \( \) \)—The chief effections simulating the effects of these are \( -(a) \) Apoplexy and unamic coma \( -These \) may more or less resemble poisoning by opium, or narcotics similar in action thereto (see \( Drum^i \)) (b) Epidepsy \( -1 \) fatal attack of this affection might possibly be mistakin for hydrocyanic acid poisoning. Didth lowever seldom results from a first attack of epidepsy, and a history of previous attacks would indicate the nature of the case \( (c) \) budden death from heart disease. This may be mistaken for hydrocyanic acid poisoning or for one of those cases which sometimes occur, of death by syncope from a single over dose of chloral. The presence of post morten app curances of advanced heart disease. In some cases of sudden death from hart affection, however, no marked appearances of the heart are discoverable after death.
- 3 Spinal poisons (see Chap AMA) The effects of possions of this class may be more or less sunulated by—(a) letanus.—This closely resembles strychinus poisoning (which see) (b) Cerebro spinal meninguis. This affection is accompanied by itetanic spisms, more or less resembling those of strychinus poisoning. Meadache

fever, hyperasthesia, and debrium precede the tetanic symptoms.

(c) Convulsions in young children proving (as sometimes happens) rapidly fatal may simulate poisoning, the more so as opium poisoning in children is often accompanied by convulsions. In some cases the attack may be traced to dentition, indigestion, worms, or other source of irritation, but sometimes no cause for the attack is discoverable.

4 Cardiac poisons (see Chap. XXX)—The effects of a poison of this class may be simulated by heart disease (see above), or by sudden death from embolism, especially of the pulmonary artery. In this last case, the discovery of a plug obstructing the affected vessel would indicate the cause of death,

### 2 POST MORTEM APPEARANCES IN POISONING.

Many poisons leave no characteristic post mortem appearances, but irritant poisons usually leave well-marked signs of their action. Such signs may consist in the presence of—

- 1. Redness of the mucous membrane of the stomach and other portions of the alumentary canal, due to inflammatory action Such redness may be the result of disease, but is usually the result of the administration of an irritant poison. When due to poisoning, the redness may vary in degree from unusual vascularity to a deep red velvety appearance. The nucous membrane is softened and opaque, and may show dark patches, due to underlying extravasated blood. Often its surface is covered with a glarry tenacious mucus, in which particles of the poison may be found entangled. Usually, in irritant poisoning, these appearances are chiefly met with in the stomach. Redness due to inflammatory action may be more or less simulated by—
- 1. (a) Staining with red dyes.—Chemical tests will usually distinguish this, most vegetable reds being turned either blue, or green by alkalies or yellow by acids. Examination under the microscope also will, in such cases, show that the redness is not due to distension of the blood vessels (b) Congestion—In some cases of sudden death, especially from congestion of the brain, or from cardiac disease, the nucous membrane of the stomach is found congested, and patches even of extravasated blood have been found beneath it. On dissection, the mucous
  - In death from heart diseases the condition of the stomach mucesa frequently bears a striking resemblance to the condition in gastritis or irritant poison, so much so that Prof. Powell is in the habit of calling a condition of deep injection with patches of punctate ecchymosis, the "cardiac stomach"

membrane is found to be tough and trusparent, and not as in irritant poisoning softened and opening from inflammation

- 2 Discolorations other than reduess of the parts with which the poron has come into contact
- In some cases such discolorations are met with an the altimentary canal. Thus in arsencial posoning gellow patches due to conversion of arsenious out le into sulph de are often found on the mucous membrane and in cases of copreper posoning a blue or grace coloration may be foun! In cases of corresive sublimate possoning such as ly Burroughs Welcomes selonds of mercury perchloride green discolorations may be found no the unocous membrane of the altimentary canal and on other parts e.g. the skim
- 3 Ulceration of the mucous membrane of the stomach Ulceration from disease must not be mistaken for this
- Generally but not always an disease the ulcer is only just surroun led by redness the symptoms are slight and unless due to malignant hissase the inlividuits affect! are generally young women—from eighteen to trenty three years of age. In irritant poisoning the redness as a rule is affused over the whole stomach principes of the poison may be found ithering to the ulcer the ulceration may extend into the diodenum in the symptoms are severe
- Learness or chemical destruction of the tissues and perforation of the violath—In cases of corrosive poisoning marks of corrosion may be found on the skin or in the mouth, throat or casophagus or on the mucous membrane of the stomach Perforation of the stomach may be found, this however is compartitively rare in justicing

Post morte n softening of the stomath with or without perforation due to the action of the gistrie june is sometimes met with, and must not be in stakin for corrosion. In such post storie a softening tependent parts of the stomach and sometimes neglibouring organs are affected. There is no unit muntory rethrees and the munous membraness gelationus and transparent. The extent of the softening also is likely to be greater the longer the period which has disp is inneed doubt.

5 Post mortem apperrances of mitation may also be found in the air passyes, in cases of poisoning by volatile or gaseous irritants eg aumonia and hydrochl me acid and in the case of certain irritant poisons eg cantharides in the kidneys or urnary passages. A yellow tinge of the skin is a common post mortem appearance in acute poisoning by copper and phosphorus and in the latter fatty degeneration of the liver is almost always present.

Some non urntant poisons, eg hydrocyanic acid emit on opening the body a particular odour which may indicate the nature of the case. In others during the post riorier; examination portions of the joison used, eg datura seeds, may possibly

be found and identified In the great majority, however, the post mortem appearances present merely indicate the 'mode' of death (com', asphyxia, etc.), and are therefore consistent with death from causes other than by poisoning

## Directions for making a Post Mortem Examination in a Case of Suspected Poisoning.

The chief points requiring special attention are -

- 1 Examine the state of the pupils.
- 2 Examine surface and orifices of the body, especially the mouth and throat, for marks of egrosion—This is most important. It frequently happens that in corrosive poisoning, chemical analysis can do no more than prove the existence in the viscera of a salt, e.g. a sulphate or an ovalite, which may have been derived from the poison swallowed, or may have been introduced into the body as a constituent of an article of food or medicine. In such a case failure to examine the mouth and throat for marks of corrosion may make it impossible to prove that death was due to poison.
- 3 Stomach, mucous membrane and alumentary canal should be examined at the time the post mortem inspection is made Appearances indicative of the action of a poison are hable (from decomposition, or from the action of preservative fluids) to disappear from the mucous membrane. Hence after removal of the stomach and intestines, these should be cut open, and their internal appearance noted. Suspicious particles found adhering to the mucous membrane of the stomach should be picked off, and preserved separately. (See rules in Appendix AFT)
- 4 Preserve matters for analysis.—In addition to the stomach, its contents, and the contents of the intestines, one kidney, and a portion of the liver, at least 1 lb in weight, also the urine, should always be preserved. Failure to preserve a portion, or a sublicient portion, of the solid viserin, may result in entire failure of the chemical analysis. Thoroughly clean visualistic preventing decomposition, spirit should be added to the matters preserved (except, of course, to fluid matters, in cases of sustingues of the spirit of salt solution used, in case any question should arise in regard to its purity. The vessels containing the

matters preserved for analysis should be sealed and care taken to prevent their being tampered with

- 5 Transmit articles for analysis—To secure identity the containing vessels should be properly labelled and an impression of the seal used in closing them (which of course should be a private seal) enclosed in the letter advising their despatch. The tox containing the vessels should be franked A summary of the case should always be forwarded to the analyst. It must be recollected that the quantity of matter available for analysis is limited and that the quantity of moster present is frequently very small. Sub-division therefore of the matters under examination is to be avoided as much as possible and this cannot be the case if the analyst is given no guide to the class of poison to be searched for and as a rule he cannot begin his analysis until the full report is received by him.
- 6 Examme rest of the body—This should never be neglected. It sit uit be remembered that even in cases where the suspicion of poisoning is strong, death may have been due to causes other than the administration of poison. Also that jost mortem appearance in licative of disease or injury may be found to existing with appearances indicating death from poison and that in such cases the fact of the existence of the disease or injury may even when death has been clearly due to poison be important as bearing on the question of sticade or homicide. In the case of female bodies care should always be taken to examine the vagina. Poisonous matters or traces left by their ection are frequently found in the vaginar in cases where leath has been it is result of an attempt to procure abortion. Even also in other cases poison may be found in the vagina (see Opium Il oisoning)

#### 3 CHEMICAL ANALYSIS

This is usually performed by an expert chemist as the ordinary medical man has not the requisite technical shill or appliances for the delicate processes necessary. The object of chemical analysis is to ascertum (1) the presence and character of the poison (2) if possible it e quantity of poison taken and (3) how the poison was administered etc. The detection of poison in the body is the most important proof of poisoning it is improbable to have been introduced after dethi--if found, deposited in the solid organs could not have been so. When poison is found there is the question whether it was it cause of death for death may be the result of other injury, etc. On

the other hand, posson may disappear from the body by voint. 'ing, purging, or by the urine or be decomposed Poissons, after absorption, tend, to undergo elumination by natural effort, eg by the lungs, skin, or kilineys. Hence, during life, in cases of poissoning, poisson may be detected by analysis in the urine, and if, in a case of poissoning life is prolonged for some time, no poison may, after death be discoverable in the body. The longer life is prolonged, and the more soluble or volatile the poison, the more likely is this to occur. Complete elimination has been known to take place, in a case of arisement poissoning, in a fortunght, and, in a case of antimonial poissoning, in a megal, and may occur very arpidly in the case of very volatile poissons, like hydrocy and acid and chloroform

Poison may be detected by analysis —(a) Before death in the (1) vomit, (2) urine or in other evacuation, (3) or in food, or other suspected articles (6) After death, in the contents of the stometh or intestines, or, owing to absorption, in the fliver, kidneys, or other parts of the body A-A-X-2-CA-

The longer the duration of the case, the less likely as it that any of the poison will be found after durth in the contents of the stornch and the more likely as it that if poison is detected at all in the body, it will longly be found in some solid viscern. Hence the importance of submitting portions of these to analysis. I or the composition of poisonous proprietary medianens, see Martindale & Westcott's Extra Pharmacopeia II

When a poison is found, it does not necessarily imply poisoning Poison may be introduced into an article of food, in order to support a false charge. Again, poison may be introduced into evacuations, or even into visegers, with a similar object, or these may have become accidentially contriminated with poison from impurities in the containing vessel. Hence the importance of (1) if possible, securing for analysis voint, etc., ejected in presence of the medical attendant, (2) using only thoroughly clean vessels holding matters to be analysed, and (3) preserving such matters under scal, etc., so as to prevent their being tampered with. Suppose, however, that poison is found, and that such poison has not been introduced in one of the ways indicated above, the case may still not be one of poisoning, because the poison discovered—

(a) May be a natural constituent of articles of food,  $c_{ij}$  oxalia and in combination is found in certain vegetables, or, (ij) May have been given in the course of medical treatment,  $c_{ij}$  arsenic or mercury (see these poisons). In two other cases also, a poison, or substance resembling a poison, may be found in the viscera of an individual and the case yet be not one of death from poison, viz.—(c) When death has been due to

some other cause, eg drowning or langing operating before the poison has fully exerted its action on the system, or, (d) When the substance found is a 'Ptomaine,' or alkaloid resulting from decomposition (see Ptomaines)

The total quantity of poison found in the viscers of an individual may be less than a minimum poisonous dose and the case may yet be one of death from poison. I requently a large proportion of the poison swillowed is got rid of by t evacuation. In this way the whole alimentary tract may be freed from the person and only that portion which has been absorbed remain in the body. This absorbed portion again is distributed more or less throughout the whole body Obviously however only a tractional part of the body can be examined, and the quantity of poison found in this therefore, is only a fraction of the quantity the body contains Again by climina tion through the emunctories during life a portion or even the whole of the absorbed porson may be removed from the body and yet death occur from the effects of the poison In such a case the whole body may not contain such a quantity of the poison as amounts to a minimum fital dose

On the whole therefore the quantity of poison found in the body is in the great majority of cases of little importance. In a few cases however it may be important cg when the quantity found is smill and the porson is one sometimes present as a natural constituent of food or sometimes given as a matheme. Hence where possible the quantity present should always be determined.

When no poison is found, the case may jet be one of poisoning under the following circumstances —

(a) From the poison having disappeared by evaporation of by evaporation This as already jointed out is specially likely to occur in the case of very solitile passons or in the case of very solitile passons e.g. in poisoning by the corrosive needs or in case where an individual having the poison (b) From neglect to submit certum matters (or a sufficient quintity thered) to analysis e.g. in cases where the individual has lived for some time after administration of the poison and no poition or only very small portions of the solid viscers are, submitted to the analyst Again of several articles of food one alone may contain poison and this may not have been submitted (c) from the poison having undergone charmed destruction by exidation or putterfection. This may occur in the case of organic but not in the case of inorganic poisons.

poisons may undergo destruction by oxidation in the body during life Organic poisons, aguin, may be destroyed by putrefixetion after death, some, however, eg strychinic and opium have, been found to resist putrefixetion for long periods (il) From there being no reliable means of extracting the poison from substances containing it or no satisfactory tests for its identification (e) From with of care or skill on the part of the analyst

The case of R v Catherine Wilson (p 455) is an example of a conviction for murder by poison notwithstanding the fact that no poison was discovered in the viscera of the persons

poisoned.

Should a poison be found, a portion of it should, if possible, be preserved for production before the Court (Ind Evid Act, s 60)

## 4 Test Experiments on Lowel Animals

The evidence from experiments on animals, the 'physiological test with the contents of the stomach and vomited matter or extracts from these, may take the form of—

1 Administration of suspected substances, such as protions of (a) Food—This is often employed as a rough preliminary test for the presence of poison. (b) Vomited matter—An experiment of this kind is sometimes the result of academ, and is open to the fallacy that movid secretions, eq bile, may, when swallowed by animals, cause symptoms of poisoning (c) Eliminated poison—This is especially useful in the case of organic poisons for which there are no distinctive chemical tests, eq aconitia and daturia (see, however remarks on 'Ptomaines')

This is the ordinary physiological test for aconite and datura—the extract by Stas or other process for extracting alkaloids is put into the eye of a cat, or administered internally to a cat by the stomach pump

2 Comparison experiments — In the case of suspected poisoning by a substance the action of which is not well known, it may prove useful to administer to an animal a dose of the poison supposed to have been employed, so that the symptoms present in the case may be compared with those which arise in the animal experimented on Experiments of this kind are open to two objections

(a) Some animals are apparently unaffected by poisons, which act violently on man, and herbivora are as a class less affected than carnivora, eg pigeons appear to be unaffected by opium, some varieties of monkeys appear to be unaffected by strychine, and rabbits appear to be unaffected by belladonia, and fowls by strychinare. It should be noted, however, thit poisoning in the human subject may arise from eating the flesh of animals that have fed on plants not poisonous to the animal but poisonous to man. (b) The symptoms produced in the animal experimented on may be different from those of the case although the same poison was used in both, either from the action of the poison on the animal being different to its action on man or from failure to properly proportion the dose to the sate of the animal.

The weight of the animal used in the experiment should always be recorded with the weight or quantity of suspected poison administered In every case a control experiment should be made on a second munal of the same species, and

as far as possible of the same size and weight

#### CHAPTER XXIII

# CORROSIVE AND IRRITANT MINERAL POISONS.

## General Symptoms of Irritant Poisoning.

THEST are divisible into (a) Throat symptoms, (b) Addominal, and (c) Later symptoms (a) Throat symptoms.—These are pain, difficulty in swallowing, and feeling of constriction, and (in corrosives) marks of corrosion in the mouth and throat (b) Addominal symptoms.—These are epigastric pain, thirst, nauser, vomiting, purging tenesmus and dysuma. The stools and vomited matters often contain blood. (c) Later symptoms —These are acute inflammation of parts, pain, and inflammatory fever, or collapse accompanied by a quick feeble pulse, and cold sweats, sometimes the anus becomes evocrated. Various symptoms due to the specific remote action of the poison may also be present, and in cases which survive, stricture of the guillet may result

The order in which the symptoms appear varies according as to whether the case is one of corrosive, or of non-corrosive irritant poisoning. In corrosive poisoning, the throat symptoms appear first, and come on immediately, or almost immediately, and often the glottis and traches are afficied causing dyspinea. In non-corrosive irritant poisoning, the abdominal symptoms appear first, and are followed by throat symptoms. In non-corrosive irritants, the interval between swallowing the poison and first appearance of the symptoms varies, it may be very short in the case of the more soluble irritants, or may be half an hour or more in the case of less soluble ones.

Death may occur.—(a) Rapidly from shock, as in some cases of arsenical poisoning, or from suffication, as in some cases of corrosive poisoning (b) Less rapidly from syncope due to absorption and secondary action, as in some cases of oxahe acid poisoning. (c) Still less rapidly from exhaustion due to protracted irritation, or (d) In corrosive poisoning, after

9 TF

a considerable period, from starvation or sufficiention the result of local injury

Post mortem appearances of irritant poisoning are signs of irritation or corrosion of the mucous membrane of the alimentary canal In some cases similar signs may be present in other situations

Treatment.-In cases of irritant poisoning the following indications should be followed -1. Elimination. Usually there is free vomiting which should be encouraged by comous draughts of warm water. In some cases emetics or the stomach pump may be required, the latter, however, should I never be used in corrosive porsoning 2 Prevention of action -The means whereby this indication may be carried out have already been sufficiently indicated (see ante, p 452) Here it may it noted that in the case of vegetable and animal irritants. antidotes are, as a rule not available 3 Counteraction and remotal of effects—Under this head the employment of measures calculated to allay irritation-among them administration of demulcents—is indicated. Oily demulcents must , not be given in poisoning by phosphorus or by cantharides, these poisons being soluble in oil Stimulants may be given to counteract depression. In cases of corresive poiscoing laryngotomy may be required.

Irritant poisons may be conveniently classified as —(1) Corrosive poisons including mineral acids and alkaloids, (2) Non-metallic irritants and organic acids, (3) Metallic irritants (1) Vegetable irritants, (o) Animal irritants, and (6) Mechanical virtuals.

### Corrosive Mineral Acids.

The chief of these are —Sulphuric acid or oil of vitriol, hydrochloric or mutiatic acid or spirit of silt mitric acid or aqua fortis

Action, and origin of cases.—These three acids are very similar in action, and are powerful corresives, except when mixed diduted, when they act as simple irritants Cises of poisoning by them are rare in India, but tolerably frequent in "Lurope Owing to their marked properties, these acids are selden used homicially, a few cases, however, of homicials

<sup>1</sup> Only one case (suicide by mitric acid) occurred in the Bombay Presidence in twenty years

poisoning of children by sulphuric acid are recorded. Accidental cases, except among children, also are rare. Most commonly adult cases of posoning by these acids are suicidal, and in England form about one twelfith of the total suicides by posson. Sulphuric acid has been injected by mistrike into the rectum as an enems, and has been intrown up into the vagint for the purpose of procuring abortion. Not inficiently in England, and in rare cases also in India, sulphuric acid is thrown over the person in order to cause injury ('vitriod throwing'). Sometimes nitric acid is used in the same way A few accidental fatal cases from inhilation of the vipours given off by nitric acid (see Mitrous Acid) have occurred, and a case of homicide by pouring nitric acid into the ear during sleen is on record.

General Symptoms.—Swallowed in a tolerably concentrated condition these acids cause Immediate burning pain in the mouth and throat, followed by pain in the abdomen Vomiting of brown or black matter containing blood, mucus. and shreds of mucous membrane The vemited matters. especially those first elected, may effervesce on coming into contact with the ground (owing to the acid acting on car bonates) There is tenesmus, but no purging difficulty and pain in micturating in swallowing, and often also in breathing The lips and interior of the mouth, unless the poison has been conveyed to the back of the throat by a spoon or some such means, are discoloured, or shrivelled and blistered. The discoloration, at first white, afterwards becomes ash grey or brown, or if nitric acid has been employed, turns yellow Marks of the action of the acid may be found on the skin or clothes, these are stained yellow if from nitric acid, and brown -or, if on coloured cloth, dull red-when due to sulphuric Hydrochloric acid does not stain the skin, but stains coloured cloth very much like sulphuric acid

# Special symptoms:-

Sulphuric acid.—Salivation coming on about the second or third day has been observed in several cases. In exceptional suicidal cases there has been considerable delay in the appearance of serious symptoms (see two undernoted cases), and in one case vomiting ceased in four hours, and did not return, although the pittent lived thirty-one hours. In a few cases sulphate of indigo—a solution of indigo in strong sulphuric acid, used in dyeing—that been taken giving rise to symptoms exactly like those of sulphuric acid poisoning, except that the mouth and vomited matters, and in some cases the urine also, are turged blue.

Cater — Possoning by sulphure acid, (a) appearance of urgent symptoms delayed—A min, et fifty as, swallowed by mistakes a desert appearance of visited to admission into hospital, he was at let to walk to be a supported on the control of the contr

Hydrochloric acid.—In one case of poisoning by this acid salivation came on rapidly, in another convulsions preceded death, and in a third delirium came on on the second day, followed by paralysis of the limbs. The vapour of hydrochloric acid if inhaled acts as a poison, causing great irritation of the air passages.

Gase—Hydrochlora and pousons;—In 1897 a man in Coloutta was advised to purchase, belf an enume of hydrochlora said from a banish's shop and to take it with some water for the cure of some discoser from which he was suffering. He drank the strong unblutted and, and died from its effects after exhibiting all the symptoms of corrows poisoning. The mucous membrane of the stomach was superficially chartered at several places an I yellow patches were found in mucous membrane of the throat and iguilet. Ao free and was found in the shoranch, as he was treated with alkalize molicines in the loopital bulghades were detected in the viscous but abundance of hydrochlora edd, in combination with in the viscous constant of the combination with the viscous constant of the combination with the viscous constant of the combination with the viscous constant of the viscous const

Nitric acid —The immediate effect of nitric scal on the living tissues is to coagulate the albumen. The strong scal produces a yellowish compound, acatho protect acid, which forms the typical yellow stain of this reid on the skin, nucous membrane, or clothes. In one case of poisoning by this scid lock, aw was present, and in another insensibility.

for — Nire and powering—accidental—A. Hin liu in Calentia drank-by mastake for residunce some mirror of a hach he had obtained to clean gold and doed from use on mirror of the hard to channed to clean gold and doed from the control cryotope in the control cryotope and the control cryotope in the control cryotope in the control cryotope in the control cryotope in the page when the specific allowed and soft need to clean the property in the specific allowed in the specific allowant and the specific allowed in the specific allowed

A case is recorded of poisoning by a mixture of mitric and sulphuric acids. Nitromuriatic acid is used in the arts for dissolving gold and other purposes, but does not seem to have given rise to any cases of poisoning.

Symptoms in acid poisoning.—Death may occur rapidly from shock or suffocation Children poisoned by sulphuric acid

often die from the latter cause, the poison never revolung the stomach Hydrochloric acid poisoning also is apt to end in death by suffocation, due either to spasm, or leter to corrosion and cidema of glottis Death may take place less rapidly from exhaustion, or, after months, from starvation, due to stricture of the asophagus. In the case before referred to, where intricacid was poured into the err, death took place in thirteen weeks, from necrosis and inflammation spreading to the brain. Death usually takes place within twenty four hours, but has occurred (in nitric acid poisoning) in an infant in five minutes, and in an adult in one hour and three quarters. The longest fatal periods recorded are, in sullpluiric acid poisoning, fortyfive weeks, and in nitric acid poisoning two years, both from starvation, due either to stricture of guillet or to destruction of the peptic glands.

Fatal dose -The more concentrated the form in which these acids are swallowed the more likely is a given quantity to cause death A very few drops of any of the three acids may cause death from suffocation and the more empty the stomach the more likely is scrious injury to it to Hence the least quantity required to destroy hie cannot be precisely stated The smallest doses which are recorded to have proved fatal are sulphuric acid 1 druhm, nitric acid (in a child of thirteen) 2 drachms, and hydrochloric acid about & ounce The largest non fatal dose of sulphuric acid recorded is 8 ounces and several instruces of recovery after swallowing an ounce of hydrochloric acid are reported Post mortem appearances -These are usually marks of the acid as before described on the clothes, skin and lips and in the mouth Signs of inflammation and corrosion in the resophagus and sometimes in the larynx Stomach in the majority of cases discoloured (yellow from mitric acid, brown or black from the other two scids) inflamed corroded and sometimes perforated Marks of the action of the acid may be absent from the mouth if the acid has been poured down the throat with a spoon, absent, or nearly absent from the œsophagus, even although the poison has reached the stomach , and even in fatal cases, altogether absent from Perforation of the stomach has been found in about one the stomach third of the fatal cases of sulphuric acid poisoning is rare in nitric acid, and still rarer in hydrochloric acid poisoning

Treatment.—The stomach-pump must not be used. Give calcined magnesia, carbonate of magnesia, chalk, or carbonate of soda, followed by muchginous dripks. If death from suffocation threatens laryngotomy must be performed. In the after treatment leeches and other antiphlogistic remedies may be required. Exconations should be washed with lime-water and treated as burns. Distress due to inhalation of hydrochloric acid vapour may be relieved by inhalation of weak ammonia.

Detection.—In fatal cases of poisoning by these acids, especially if life has been prolonged for two or three days,

no true of the poison may be discoverible in the viscera Should the presence of one of these acids be detected, it is important—salts of these acids being common constituents of food and medicine—to ascertain whether any of it is present in the free condition. If no free acid be found, the quintity of combined acid present becomes of importance. The quintity of combined acid present becomes of importance. The quintity of containing a state of the present present present present present in hydrochloric acid presents, as this acid (in loose combination with pepual) is contained uncombined with bases in the gastric juice to the extent of about 0.2 per cent or more.

Sulphuric acid and solutions of sulphates give a white precipitate with barium nitrate which is (1) insoluble in dilute mitric acid, (2) insoluble in water and (a) when collected, dried, and heated with powdered charcoal before the blowpipe, converted into barium sulphide, soluble in hydrochloric acid with escape of hydrogen sulphide recognized by its odour, and by its blackening paper witted with lead acetate solution Tree sulphuric acid chars organic matter. It may be separated from soluble sulphates by concentration on a water bath and treatment with quinine, separating the quinine sulphate formed, after thorough drying by strong alcohol, in which quinine sulphate is solulic but alkaline and metallic sulphates are insoluble. The alcoholic solution is then to be evaporated to dryness the residue dissolved in boiling water, decomposed by ammonia filtered, and the sulphing acid estimated in the filtrate by precipitation as burnin sulphate

Hydrochloric acid and solutions of chlorides give (1) a white flocculent precipitate with silver nitrate solution, soluble in ammonia but involuble in boiling nitric acid, and (2) when boiled with H-SO, and mingane e dioxide evolve chlorine, recognizable by its colour odonr and bleaching action on moistened litmus paper Free hydrochloric acid evolves chlorine when boiled with manganese dioxide only, and when mixed with HAO2 dissolves gold Organic mixtures to be tested for the free acid should be distrilled, and the distrillate tested for HCl, or if this as sometimes happens, fails resort may be had to either (1) the quinine process as for sulphuric acid described above, estimating the chlorine in the decomposed filtrate volumetrically with silver nitrate solution, or (2) the organic iniviture may be divided into two equal portions and one of these neutralized by solid carbonate, both are then evaporated to dryness, the residues incinerated, and the chlorine in each superately estimated The excess of chloring in the neutralized portion corresponds to the free acid present in the original fluid

Nitric acid and solutions of intrates (1) heated with H<sub>3</sub>SO<sub>4</sub> and fragments of copper dissolve the copper with escape of lower oxides of introgen known by their red colour and their liberating iodine from potassium iodide (2) boiled with H<sub>3</sub>SO<sub>4</sub> and a drop or two of indigo solution decolorize the indigo (this test by itself is not conclusive evidence of the presence of INO<sub>2</sub>) and (3) if to a portion of the solution under test ferious sulphate solution and then a little H<sub>3</sub>SO<sub>4</sub> be cautiously aided a brown ring appears at the point of contact of the H<sub>3</sub>SO<sub>4</sub> with the other fluids Free nutric acid gives the above reactions without the addition of H<sub>3</sub>SO<sub>4</sub> and if mixed with HCl dissolves gold It may be separated from organic mixtures by the quinne process described above for sulphune and hydrochloric acids

Stams on cloth, etc.—The yellow stams of nutre acid on the issues or on cloth treated with weak crustic potash solution acquire an orange colour while todine stams disappear and bile stams remain unaftered. Stams of sulphuric or hydroclioric acid on dark coloured cloth are usually reliable the rot intidisappearing on addition of ammonia. Sulphuric acid stams are more moist and show more evidence of corrosion than hydrochloric acid stams. Stams on cloth etc. should be macerated in water which will acquire an acid reaction if free ricid is present in the stam. The watery collution may then be tested for the suspected acid. A comparison experiment should at the same time be made with an unstained portion of the cloth. Burns must not be mistaken for marks of corrosion by sulphuric acid. Blyth on the authority of Vaschka mentions a case where free sulphuric acid found in a charred mark on an infant's bed was ascertained to be due to the sudden quenching with water of a live ocid which hyd fallen thereon.

The detection of these acids may be required in criminal cases other than cases of poisoning or causing actual bodily hurt as in a crise where a bottle of this liquid loosely stoppered and leaking was sent by post and a prosecution under the Post Office Act thereupon instituted against the sender A mixture of HNO<sub>3</sub> and H<sub>2</sub>SO<sub>4</sub> is used in making intro <sub>L</sub>lycerine and other explosives the identification of these acids there fore might be required in support of a charge of illicity minu facturing such substraces. Nitric acid is used in India for the purpose of sweating silver coin the method employed being apparently to steep the coins for a short time in this acid and then by adding metallic copper precipitate and recover the silver. Highrenhore acid has been used in for, ery to remove mixts of writing ink from paper. Hydrochloric acid

gue acts injuriously on vegetation and ly law in England alkali manufactures—making carbonate of soda by the salt cake process—render themselves liable to penalties if the fail to condense to a strited extent the hydrochloric acid evolved in the minufacture Hydrofluoric acid HI usel for etching on glass is a powerful corrosive. One fatal case is recorded of poisoning by this acid in which half an ounce was swallowed and death took place in thirty five minutes!

## Alkaline Corrosives

The chief poisons of this class are the caustic alkalies potash, soda, and ammonia and their carbonates. These like the acid corrosives acid as simple irritants when sufficiently diluted. Cases of poisoning by the alkaline corrosives are rire and usually accidental. One fitted case occurred in Bombry in twenty tears namely a case of suicade by crustic rummonia.

In Lurope cases of poisoning by the corrosive alkalies are commonly accidental and owe their origin to the extensive use of these substances in the arts expecially carbonates of potsal and soda. Impure carbonate of soda is sold in the bazaris of Bombay under the names of Soyil bran and Pangadal ara, impure carbonate of potash as Javalhara and the mixed carbonates as Pangadahhara?

Symptoms—These are similar to those caused by the corrosive acids except if at the vointed matters are alkaline and do not efferivesee on the ground and purging—which is not common in poisoning by their corrosive acids—is a frequent symptom in alkaline possoning. In poisoning by liquid ammonia or its vapour and by the carbonates of ammonia inflammation of the air passages is a content symptom. Caustic ammonia is less corrosive than caustic potash and caustic soda, and carbonate of soda is less corrosive than carbonate of soda is less corrosive than carbonate of concentration of the poison the greater the dagger. The past mortem signs and modes of death are similar to those in poisoning by the corrosive acids.

Treatment also is the same except of course that dilute reads, predombly dilute, regetable acids should be used unstead, of dilute all aline colutions. In poisoning by ammons inhala tion of acetic acid vapour may be used to allay irritation of the air passages.

<sup>&</sup>lt;sup>1</sup> See P! stological Action of Hydrofluoric Acid and Thuorides by L. A. Wardell M B — I 1 Ucd Gaz 1883 <sup>2</sup> Satharma Actin Calolog is of Bembay Drugs

Fatal dose, etc — Porty grams of caustic potash crused the death of an adult in seven weeks from exhaustion. About half an ounce may be looked on as an ordinary fatal dose of crustic potash or caustic soda, and about half an ounce of carbonate of potash has in more than one instance, in adults, caused death in two to four months. Curbonate of soda is much less posonies a case of recovery after suallowing twelve ounces is on record. Of crustic ammonia a quarter of an ounce of the strong solution has caused death, and half an ounce may be regarded as an ordinary fatal dose.

Laquor potassa (B P) contains 5 84 and liquor sodo (B P) 4 1 per cent of caustic alkali Strong solution of aumonia (B P) contains 323 per cent and solution of ammonia (B P) 10 per cent of NH, Compound camphor liminent (B P) contains about 7 3 per cent of NH, and has given rise to more thin one case of poisoning

Detection—Free potash and sody are most conveniently separated from organic mixtures by daily as, after which the quantity present may be estimated (in the fluid which has present through the membrane) by a standard acid. I ree ammonia is best separated by distillation. Fotash and ammonia are distinguished from soda by giving (1) a precipitate with trataric acid in excess and (2) a precipitate with platinic chloride in presence of hydrochloric acid. Ammonium may be distinguished from potassium salts (1) by their volatility, and (2) by their volving ammonia when heated with solution of caustic potash

Permanganate of potassium.- Fatal poisoning by per manganate of potassium appears to be very rare reference is made in the current text-books on toxicology and forensic medicine to the poisonous action of permanganate of potassium 1 The writers are only aware of one recorded case where death resulted from it Several, however, have called attention to toxic symptoms following its use and in the experience of one writer local sloughing followed the stupid and criminal procedure of subcutaneous injection in watery solution as an antidote for opium poisoning Thomson (Peters burger Med Woch , 1895) records a case in which a large dose of solid permanganate of potassium caused corrosion of the pharynx and death in five hours from cardiac paralysis, which is quoted by Dixon Mann apropos of the use of solutions of permanganate in the treatment of poisoning by opium Bidwell (Boston Med and Surg Jour , vol exv p 141) quotes instances where serious symptoms followed the administration of permanganate of potassium The sufferers were young unmarried

females who were under treatment for amenorrhem In one case two consecutive does of two grains were followed by intense burning pain from the throat to the pit of the stomach and serious collapse In another a does of one grain of the solid salt was followed by similar symptoms. In some correspondence (Brit. Med. Jour., vol. 1, 1897), on the possible dangers attending the use of this drug altison is made to ulceration of the mouth attributed to local action of permangante, and a case of abdominal pain and collapse following the administration is quoted by H. Powell. The actual quantity taken in the latter case is not clear. In another instance severe vomiting and collapse occurred after three two-grain does had been taken at infervals. Judging from the condition of the coats of the stomach in their case no local mischief would have been rufficiel by the use of the soft stomach time.

Case -- A woman seed 47 after drinking heavily took a handful! of crystals of permananate of potassium and throwing them into a teacupful of beer drank the mixture She was imme listely taken to St Thomas a Hospital On the way she was said to have comitted When seen she was take conscious but was unable to smak. Her line chim. fingers and the front of the right forearm were stained dark brown The tongue was quite swellen and almost black. The breath smelled strongly of stale beer. The skin was dry the pulse was moderately rapid and of fur tension. After a few moments she structled into a sitting posture and her breathing became slightly stridulous. I reparations were made for tracheotomy but before anything could be done she fell back pulseless and the respiration stopped. By the stethoscope the heart could still be heard heating faintly and very slowly although no pulse was perceptible at the wrist Artificial respiration induced one or two respiratory movements. The heart sounds ceased altogether a few moments later Death occurred 30 minutes after aking the poison A necropsy was made 184 hours after death. The chin hips and interior of the mouth were stained a deep brown. The front part of the tongue was swollen and almost black, the back part was of a deep mahogany colour The epiglotis was blackened the glottis was cole The stomach was moderately distended and showed no signs of inflammation externally It contained about two parts of fluid with which was mingled a black involute powder and some parchment like masses—probably portions of food The mucosa was control with a black granular powder, closely adherent which could not be washed off On scraning away the increstation the mincous membrane was found to be intensely hyperæmic, presenting a bright pink blush. The destructive action of the salt was evidently very superficial. A little of the black deposit had escaped into the duodenum. The mucous membrane here was also hyperamic but there was no incrustation. The liver was cularised and appeare I fatty The portion of the spleen near the stomich was soft and pultaceous, the rest of the organ was normal -C R Fox in Lancet, p 411, 1890

Lime, CaO — Vary be included among the alkaline corresives, but from its little solubility is much less dangerous than the poisons just described The symptoms, treatment etc, are the LIME 475

same as in poisoning by potash and soda. Mahingerers have been known to produce ophthalimin by applying lime to the conjunctiva. Other corrosive salts.—Certrin metallic salts, of mercuric chloride and zinc chloride, possess a corrosive action these will be described with the other compounds of these metals. A more or less destructive action on the issues is also exerted by oxalic and acetic acid see Vegetable Acids', by bromine see 'Non metallic Irritants', and by carbolic acid, see 'Narcotics', group 2

#### CHAPTER XXIV

## IRRITANT NON-METALLIC POISONS,

## Phosphorus.

RFD or amort hous phosphorus is not poisonous whilst ordinary yellow phosphorus especially in fine division, is an extremely active irritant poison. It is contained about 1½ to 4 per cunt, in various pristes used for destroying vermin and to a varying evtent usually about 15 per cent, in the composition with which the heads of some kinds of lucifer matches are tipped 4 Cases of poisoning by solid phosphorus usually arise from swallowing vermin pastes or lucifer match heads (see Case below), and are generally in adults eucodal and in children accidental Phosphorus vapour is also highly possonous, but the symptoms produced by it usually differ from those of poisoning by solid phosphorus (see below)

Case—Phosphorus possoning by match heads—A case of attempted possoning by phosphorus was reported from Purnes in 1887. The suspected substance consisted of a precket of betch ut an 18 prepared brtd, the pepper leaves (pon) mixed with catechu and hime for chrwing II was found to contain the ting of four leifer matcher. Phosphorus was detected in the match heads—L. A Wadlell, Beng Chem I'z Bens, 1897.

The symptoms in acute poisoning may appear almost immediately, but in many cases do not appear for one to six hours, in a few cases their apperture has been delayed longer, and one case is recorded where five days elapsed before they appeared.

The first symptoms are those of ordinary irritant poisoning with the following points of difference (1) the breath may be phosphorescent and have a garlicky odour, (2) the vontied matters and other exacutions may be phosphorescent, and (3) distributes a sometimes absent. Subsequently laundice sets in.

In other kinds the non poisonous red phosphorus is substituted for the poisonous yellow variety, and the heads of 'safety matches contain no phost borus.

susually before the end of the third day, often after a remission of the symptoms, and is accompanied most commonly by (a) intention of urine followed by fatal coma, delirium being sometimes present, or less commonly by (b) hemorrhage from the mouth, bowels, and gento urinary organs and spots of purpurunder the skin with death ultimately from exhaustions, or still more rarely by (c) cramps and fatal tetanic convulsions

Death in a few cases occurs before the end of the second day and before joundice has set in Usually death takes place within a week. In one case the patient survived eight months A little over one ninth of a grain has caused death. Three quarters of a grain to two grains may be looked on as an ordinary fatal dose, recovery, however has been recorded after swallowing five grains.

Phosphorus vapour.—One or two acute cases of poisoning by phosphorus vapour are on record, but as a rule this form of poisoning is chronic in character. The chief symptoms prisent in chronic cases are caries of the teeth, and painful necrosis of the jaws, 'phossy-jaw most commonly of the lower jaw, followed in many cases by death from debility. Cases of this form of poisoning have chiefly been observed in workers in phosphorus, especially lucifier match makers hence the teim 'lucifer match maker's discuse,' applied to this form of poisoning Owing to improvements in the method of manufacture of lucifer matches, and specially to the introduction of red as a substitute for yellow phosphorus cases of this form of poisoning are now much less frequent than formerly

Post mortem signs. - In acute cases fatty degeneration of the liver is always, or almost always, present, and has been found far advanced in a case where death occurred in twenty four hours The phosphorus liver, except that as a rule it is enlarged and not diminished in size, resembles to the naked eye the liver of acute yellow atrophy Fatty degeneration also may be present, of the muscular fibres of the heart, of the kidneys and of the epithelial cells of the intestinal mucous membrane Spots of extravasation are often present under the serous and ed vom risks aft sensest rather as bas sentement encount. yellow and the stomach contents phosphorescent Signs of inflammation of the mucous membrane of the alimentary canal are not commonly present. In exceptional cases the post mortem appearances have been entirely negative Treatment .--In route cases emetics may be given and vomiting promoted, or the stomach pump used No oil or fatty matter should be given. as these dissolve phosphorus Turpentine, in 40 minim doses often repeated, is recommended as an antidote Detection.-

Phosphorus readily undergoes oxidation in the hody hence after death analysis may ful to detect its presence Solid vellow phosphorus is easily recognized by its physical character resent in organic mixtures in considerable quantity it may be separated as a sediment by washing afterwards melting it if finely divided under warm water, or it may be extracted from organic matters by carbon disulphide in which it is soluble If present only in small quantity one of three processes may be employed viz (1) Mitscherlich's Acidulate the matters with HaSO, and distil them to dryness in the dark using a well cooled this con lensin, tube which will show luminosity of phosphorus to be present (2) A modification of Marsh's process by which thosphorus if present becomes converted into greeous hydrogen phosphade (PH+) which burns with an emerald-green flame and produces a black precipitate in silver nitrate solution the liquid after removal of the excess of alver showing the presence of free phosphoric acid (3) Lipouitz's method Acidulate the matters with H-SO, and boil framents of sulphur in them for an hour remove and wash the frig ments of sulphur which if il osphorus is present will be found to have become luminous in the dark owing to the deposition of thosphorus upon them I hosphorus boiled with HNO, becomes converted into phosphoric acid the presence of which may be recognized by precipitation with a mixture of aminonia ammonium chloride and magnesium sulphate solutions. In this way, also its quantity may be estimated

# Chlorine, Bromine, and Iodine

Chlorine, largely used as a disinfectant and in bleaching, is a highly irritant gas clusing great irritation and inflammation of the air presenges and acting as an irritant also on the conjunctiva. Workmen in chlorine factories are however and to become in time to a certain extent habituated to its presence. The hypochlorites contained in bleaching compounts  $\epsilon \cdot \epsilon g$  chlorine of lime and liquor sode chlorinate also act as irritant poisons Treatmant—Inhalation of diluted hydrogen sulplinde, this however must be employed with coutton as hydrogen sulplinde is in itself highly poisonous

Bromme —This in the liquid form is a corrosive poison.
In the form of vapour its effects are similar to those produced
by chlorine. One case of death in seven hours from an onice
of liquid bromine is recorded. Bromide of potassium in single
does has been known to give rise to symptoms of poroning.

In large doses taken for a considerable time it causes impairment of the functions of the brain and spinal cord, such as diminished activity of reflex action, cloudiness of intellect, impairment of memory and of articulation, and tendency to stupor

Iodine.—Free iodine is a corrosive irritant, in poisoning by the vomited matters are often blue or black owing to its action on starch. Twenty grains has cruised death, but recovery is recorded from 1½ drachins. Iodine in small doses, often repeated, is liable to give rise to chronic poisoning, the chird symptoms of which are irritability of the stomach, vomiting, and purging, accompanied by salivation and wristing of the body generally, and specially of the breasts or testicles. Iodide of potassium has frequently been given medicinally in comparatively large doses (100 grains or more a day) without producing ill effects. Sometimes, however, small doses, often repeated give rise to symptoms resembling those of sovere catarrh, and in exceptional cross such symptoms have even arisen from single small doses. In exceptional cases also the ordinary symptoms of catarrh have been accompanied by somewhat severe symptoms of irritant poisoning.

Sulphur dioxide, commonly called Sulphurous Acid This gas, like nitrous acid, acts as an irritant to the air presseges from Woodman and Tidy's experiments it appears that when the quantity is small, animals soon get accustomed to its presence, and thereafter do not suffer nearly so much from its irritant action.

# Nitrous Acid.

The vapours of mirro acid and the red gas evolved during the oxidation of matters by mirro acid. are highly poisonous, giving rise when inhiled to inflammation of the 11 prissages and lungs. A few cases of death from the inhalation of such appears are our account. In some of these the faith acan't her followed on exposure for a few minutes to the vapours arising from a quantity of nitric acid, accidentally spilled by the breaking of a large vessel filled therewith. In these cases a noticeable feature has been the slight amount of discomfort felt for the first two or three hours after the accident, death never theless occurring rapidly (within ten to fifteen hours)

 $<sup>^1</sup>$  Nitrogen peroxide (NO<sub>2</sub>) and nitrous anhydride (N.O<sub>2</sub>), the latter, by combination with water, yields nitrous and (HNO<sub>2</sub>)

Oxalic Acid. 5 1 1 1 CONSIDER OXALIC and acetic acids may be conveniently considered

Poisoning by exalic acid is rare in India but tolerably frequent in Europe In England, in the five years ending 1880, sevents four deaths from exalic acid were registered, of which sixty five (about seven eightlis) were suicidal and the rest accidental I have met with but four fatal cases in Bombay in twenty years Of these three were suicidal, and the fourth apparently homicidal Many accidental cases owe their origin to the resemblance in appearance of oxalic acid to sulphate of magnesia Homicidal cases (probably owing to the strongly acid taste of the poison) are rare. Ovalic acid and the acid alkaline oxalates are chiefly used in the arts for cleansing purposes eg cleansing leather, wooden boards etc. and removing ink stains and iron moulds from linen

Symptoms -Oxalic acid and the acid alkaline oxalates possess both a local and a remote action. Of these, the remote action is much the more serious and is usually the cause of death Local action -This is corrosive or irritant in character according to the degree of concentration of the poison Swallowed in concentrated solution, the symptoms due to the local action of the poison are immediate burning pain in the mouth and throat, with sense of constriction, followed rapidly by pain in the abdomen, and vomiting of matters containing aftered blood The interior of the mouth has a bleached white appearance, and if the patient lives long enough purging sets in, the stools containing blood Swallowed in dilute solution the symptoms due to local action are those of non corrosive irritant-poisoning There is an acid taste, but no burning pain, in the mouth, and comiting does not come on for fifteen or twenty minutes in one case it did not come on for seven hours Remote action -The symptoms due to this are twitchings of the muscles, in some, cases amounting to tetanic convulsions, numbress, tingling and cramp in the limbs, great depression of the heart's action slow spasmodic respiration, collapse and stuper or insensibility, and sometimes delirium These symptoms may be unaccompanied, or almost unaccompanied by vomiting pain and other symptoms of local action After symptoms -In cases of recovery, loss of voice has been observed, in one case complete for eight days, in another partial for more than a month. Alteration of the roice is sometimes present in acute cases. Numbress and tingling of the lunbs and twitchings of the muscles may remain for some time after the first effects of the poison have disappeared nach, and as in other cases

of correste poisoning death may occur after a considerable interval, from starvation

Fatal dose, about half an ounce, cases, however, are reported of death from one drachm (in a boy aged 16), and three drachms (in a female aged 28), death taking place in respectively twenty one hours and one hour Cases of recovery after swallowing an ounce or more are reported

Fatal period.—Exceptionally short, usually under one hour Death has occurred in three minutes, in ten minutes, and in one case, not until the fourteenth day, from starvation. Woodman and Tidy mention a case where a man is reported to have walked ten miles after swallowing an ounce of ovalic action.

Post mortem signs.—These vary according to the degree of concentration of the poison and rapidity of death. If the poison has been swallowed in a tolerably concentrated form, the lining membrane of the month, throat, and gullet is found white shrivelled, and easily detached. If death has been rapid, the nucous membrane of the stomach may be pale, but usually is deep red, in places black, and may be found crode. Perforation is rare. The stomach his been found so soft as to tear easily. The intestines may be found infirmed, and the lungs are often conjected. Congestion of the brain has been found, and in one case, probably from violent vomiting, apoplectic effusion was present.

Treatment.—Administration of saccharated solution of lime, or of chalk suspended in water. Magnesia or carbonate of magnesia may be given instead of chalk. After administration of antidotes, warm water may be given freely. Vomiting should be promoted. Alkalies are inadmissible, and the storrechpump should not be used if much correction be present, and, if used, should be introduced with great caution.

Oxalates —Two and potassium oxalites are in common use in the arts vit the binovalate and the quadrovalate. Both are sold under the names of 'silt of sorrel,' and "essential salt of lemons,' and both are nearly as poisonous as oxale aced. The binoxalate has caused death in eight minutes. Half an ounce of it has proved fatal, but recovery is recorded from one ounce Several deaths have occurred by cating the stalks of rhubarb boiled. The symptoms, treatment, etc., are precisely the same as in poisoning by oxale acid. Detection—Alkaline oxalates are found in many plants, eg in wood sorrel, and in its Indian substitute Rumex vesicarius (Ghuka), and also that oxalate of lime is found in many plants. In case, therefore, of alleged

<sup>1</sup> E g in rhubarb root and squills See also Arums

potenting by orthe and or an oxiste, the post mortem appearances are, and the determination of the quantity of potent may be, of great importance. Oxisic and is entirely dissipated by heat. In solution it yields (1) With intrate of silver a white precipitate insoluble in not acetic and, but slowly soluble in cold and which when collected dired, and heated, is converted into metallic silver with a slight explosion. (2) A white precipitate with sulphir of lime solution insoluble in neetic and which, when dired and heated becomes competed into carbonate of lime without charring. From organic mixtures, oxidic and and precipitating the filtrite with sectate of lead subsequently and precipitating the filtrite with sectate of lead subsequently decomposing the oxidate of lead by suspending it in water, and subjecting it to the action of a current of hydrogen sulphide Insoluble oxidates should be first decomposed by boiling with solution of crustic potable.

Acetic acid, tartaric acid, and citric acid.—Acetic acid acts as a corrosite if concentrated but as in irritant when dilute, one fital case is recorded in a gil act inneteen, and another in a child aged two Vinegar contains about 5 per cent, of this acid and might possibly in large doses act as a posson Acetic acid may be separated from organic mixtures by distillation and recognized (1) by the colour and (2) by boiling with sulphuric ac 1 and alcohol when a peculiar aromatic smelling vapour (acepic etter is evolvid). Tartrice acid and errita caid in large doses act as irritant poisons, one onnee of tartaric acid has caused the death of an adult and one fatal case also in an adult, from four or five tablispointules of cream of tartar (potassium tartricto) is ou record. Citric acid is believed to be more poisophys than triatric acid.

# Salicylic Acid Poisoning

A case of poisoning by salicylic acid was reported from Cooch Behar. The decreased after taking his evening meal vointed, had several loose stools and died. The post mortem examination revealed patches of congestion of the mucous membrane of the stomach and the stomach was empty. The mucous membrane of the small intestines was highly congested and they contained bloody fluid. The large intestine was empty.

There was enlargement of the spleen. The stomach and portions of liver and kidney were forwarded to this department for examination and salicylic acid was detected in them —Ch Bose,

Beng Chem Ex Rept , 1910

#### CHAPTER XXV

## METALLIC IRRITANTS.

## Arsenic

ARSENG is the favourite poison employed by munderes in India, as in Europe just as opium is the favourite of succides. It is fortunate for the ends of justice that it is so as the most infinitesimal traces of this poison can be detected with such absolute certainty and ease that there is almost no possibility of its escaping detection, if suspicion be once aroused. But it frequently happens that when the amount administered is not sufficient to cause violent irritation, the murder pisses in detected and not until the administerer emboldened by success, develops a lust of murder is suspicion aroused by the number of his or her victims.

Its comparative tastelessness, the minute quantity of the dose necessary to destroy life the readiness with which it can be procured in any bazair, and the resemblance of its symptoms to those of the natural endemic discuss—cholera—all render it an easy and effective agent in the hands of the subtle poisoner

In Europe the Marchaouess de Bruvilliers who lived in the time of Louis XIV studied the effects of assential poisoning by giving poisoned sweets to the poor in the hospitals. She afterwards poisoned her father and two trothers. Another woman at the beginning of the eighteenth century poisoned more than 600 persons while a third in more modern times disposed of 15 including her three children two husbands and an intended third. Henrital Robinson was convicted in 1883 of the murder of her son by arsenic and when the bodies of eight other members of her family and servants were exhumed the same poison was found in all of them but two. Twenty four cases of poison by means of fly papers were recorded.

Homicidal poisoning by arsenic is declining to some extent owing to the restrictions imposed on the sale of poisons and the publicity in the newspapers of murder cases Such publicity gives a person of criminal tendency a wholesale fear of detection and a sense of insecurity in the face of the growing science of toxicology.

# It is less commonly used for suicide

Action — Irsenical compounds act (a) locally as irritants and (b) remotely on the nervous system hence in cases of atsenical poisoning there may be present (1) Irritants; improms and (2) Actions symitoms

1 Irritant symptoms — Arsenical compounds act as irritants to the nucous membrine of the stomach and intestines executing this action even when introduced into the system by channels other than the mouth eg even when absorbed this igh a wound. They also event an irritant action on the various emunctories.

Hence in cases of arsenced porsoning there may be present (a) The usual symptoms of irritant possoning (unaccompanied however 1) my metallic or acid taste in the mouth) namely eggratric and abdominal pain thirst comiting tenesiuus purgim etc and even perforation of stomach with presence of blood in the comit and stools and (b) symptoms due to the irritant action of the poison on the skin kiney. Incre etc such as conjunctivities painful circuments eruptions and design matton of the cuticle salivation dys area suppression of urine leading, to ure mine come and run lies.

2 Nervous symptoms —Ti e symptoms resulting from the remote action of arset real compounds on the nervous system vary if ally in different cases. Thus there my to (a) Collapse with coldness of the surface and feeble pulse, or (b) Numbines and lingling of the extremities cramps and even paulys as or (c) Convulsin a closuc epiletitorin or tetainc and libely law or (d) Delirium and acute mann or (f) Headache drowsness, and stupor, deepening into command irritant symptoms may be inconspicuous

# Types of Arsenical Poisoning

Crees of their cal poisoning fall into three types namely, (1) Irrini (1) Aarcotic Irritant and (3) Aarcotic In the great major to decide cases well marked and soree irritant aymptoms are in sun. Such cases either (a) prove rapidly fatal—say within threnty four hours—by collepse or (b) ite usual 3) mpts as di irritant poisoning are followed by various nervous six plants; the sun alternative recovering or dynn' in one or of ir of diamety of moles from exhaustion or by comp, or in tight convolutions. In some of these irritant cases are a time of even intermissions of the irritant symptoms have been observed. In a five acute cases irritant symptoms have been observed. In a five acute cases irritant symptoms may be absent (see Air n. 486) or slight (Cissa p. 486 (1.5))

and the nerrous symptoms well marked (see Cases, p 486 (1st para )), such cases usually prove rapidly fatal either by collapse or by coma

Case (a) — Irribant argenic possoning—Large dose — The victim annitive Christian missionary of Calcutta was believed to have been possoned by his wife and her paramour. Diceased was seried with violent vomiting and purging and died in a few hours. The wife reported the death to have taken place from cholers but the police on suspicion had the body examined and the stomach its contents and portions of other viscera were forwarded for analysis. Your than 42 grains of solid white arsenic were detected in the stomach alone. The woman and I er paramour were tred at the High Court but were let off owing to insufficient exclusions them the purchase and administration of the poison—L. A Waddell, Beng Chem. Ex. Ref. 1 1897.

Case (b) -Slow arsenic poisoning-Maybrick case -Mr Maybrick a cotton broker of Laverpool aged 49 married Florence an American lady, aged 21 They had two children but the marriage proved unhappy Seven weeks before his death in 1889, Mrs M went to London and lived some days at a hotel as the wife of another man About April 12-19th 1889 Virs V purchased arsenical fly papers On April 13-20th Mr Vay brick visite i London and consulte l Dr 1 uller for dyspensia who prescribed for him mild remedies but no arsenic in one bottle of medicine ostensibly made according to Dr 1 uller a prescription, arsenic was sul sequently found Up to Saturday 27th April Mr VI was in usual health he then became sick numbed and in pun and had cramps. Alout this date fly papers were found by the servants soaking in Mrs M s room in a sponge basin carefully covered up On the 29th she again purchased two dozen fly papers from another druggist On 1st and 2n1 Way Mr W went to his office and had his lunch cent to him by Mrs M., and in one of the jugs found at the office after his death arsenic was found. On the evening of the 3rd May he was seen by Dr. Humphreys and complained of being sick from his revelenta food and had persistent comiting and coughing and tingling in throat on the 4th and 5th. The vomiting Icssened on the 6th and I owler's solution was ordered but only a quantity equal to ale grain was actually taken On May 7th the throat was re I dry and gluzed and diarrhor commenced and the result of a consultation was that Mr M must have taken some irritant in his food or drink On 8th and 9th severe tenesmus setting in with bloody diarrhea Dr Humphreys suspected arsenie and examined the urine and made a rough analysis of some Neave s food the patient had been taking. The patient died on the 10th The post mortem showed signs of irritant poisoning and an ulcer of epiglottis (caused by the lodging of a speck of arsenic) but no arsenic was found in the stomach or its contents or in the spleen. Arsenic was found in the liver intestines and in the kidneys. The quantity separated amounted to over 0.1 grain. The liver weighed 48 ozs, and from 12 ozs of the liver 0 076 grain of arsenic reckoned as As2O3 was separated Facts connecting Mrs Maybrick with the death were - On the night of either May 9th or 10th she was observed to remove from the table an opened bottle of meat juice and take it to an inner room and then replace it surreptitiously. In replacing it she was observed to take it from the pocket of an inner jacket. The liming of this pocket was found to be impregnated with As2O, and the juice contained 0 5 grain As2O, following things contained arsenic -Mrs VI s dressing gown her apron and handkerchief wrapped round a bottle, a portion of a handkerchief

Price's glycerine medicine purporting to be that prescribed by Dr I uller, three hottles of saturate I solution of ar-emons acid, havatory drain Mrs Maybrick was convicted and sentence commuted to pinal servitude for life.—T Stevenson, Mp., Gaus & Hosp. Rept., 1889

Cute (c) —Narcotte and nervous symptoms —(1) A child was reported to have had oronting in half an hour after entiting some juggery It died soon after, evidently, in a convulsion, for it is reported that "the eyes colled upwards and the lips and tongue Secure blackened Over thirty two grains of white areeine were, found in the stomach.—Mad Ohem 100 or Acoustic Color of the Color o

Case (1)—Absence of symptoms—Orhia I Ols IV, 314 relates a case of a woman aged 27 who expired in about 12 hours from a large dose of arsenious acid without any sign of pain or vomiting and but little thirst, although the usual post mortein signs were found

Cane (c)—Accidental—Largedore—Absence of vonuting—In Septem ber, 1001 a Minsulman male aged 18 was brought to the Calentia College Illospital I in Streams state that about 2 is a fiter a meal he took in mistake for child a toda or about half ounce of white arrends. He became very ill some time later and was admitted at 4 rs convosions. Extreme the contract of the

Case (f) -Irritant symptoms slight .- Of 305 fatal cases reported to the Bombay Chemical Analyser's Office during the ten years ending 1884 six fund as only meagre reports were furnished with many cases possibly others also) were cases of this form. In four of the six the duration of the case was stated, and in all four deaths occurred within fourteen hours In two of the six, there was no redness of the mucous membrane of the stomach In one of these (1), a female who sounted once only, and had no purging there was also no redness of the mucous membrane of the intestines. In the other (2) a man who had vomiting but no purging, there was one patch of redness about the middle of the rectum mortem appearances of irritation were well marked in the other four cases The symptoms reported in these were respectively (3) heat in the abdomen and thirst slight counting and purging before admission into hospital, none after (4) Had counted and purged four times before admission into hospital. While in hospital was drowsy vomited once only, and had no purging Conjunctive eight hours after admission noticed to be tremendously injected (5) Had fever and severe pain in the abdo men, no comiting, and no purging (6) Great thirst restlessness, picking at the lad clothes, and incoherence, no vomiting and no purging. Cases

ARISINIC I Compositional 187

ARISINIC IS form and 18 Property (4) and (5) although under medical observation were not during life recognized as cases of poisoning. In case (4) only one and a half grains of arsenious oxide was found in the contents of the stomach. In case (6) the quantity found was one hundred grains. In the other four cases the quantity found ranged from nine to fifteen grains h W (Beng W R 2 for 1868 69) mentions a case where a girl at seven died in three hours neither counting nor purging being present. Similar cases ar recorded by various authors. Christison (Poisons pp. 808 et seq Similar cases are 1845) gives fourteen cases all fatal within twelve hours in which only slight irritant symptoms were present. In five of the fourteen post morter appearances of irritation were either altogether absent or trilling only

In chronic cases both irritant and nervous symptoms are usually present Sometimes in chronic cases the amount of gratric irritation is slight while the irritant action of the poison! on the skin causing skin eruptions with pigmentation bronchitis etc bronchial tubes and emunctories other than the intestines is well marked. In chronic cases the nervous symptoms frequently take the form of numbuess and tingling: of the extremities and paralysis peripheral neuritis last effect has occurred in epidemic form amongst beer drinkers through contamination of arsenic in the beer. These cases show that arsenic is culminative. The sequence of symptoms in chronic poisoning is (1) digestive (2) laryngerl catarrh bronchitis and skin affections, (v) disturbance of sensibility, (4) motor parilysis with pigmentation and keratosis

Diagnosis from disease. - Acute irritant cases with col' lapse greatly resemble cholers and may be mistaken for it by midical men well acquainted with cholera, see Case p 488 and in India a common way of attempting to conceal homicidal poison ing by arsenic is to report the case as one of death from this disease Sometimes also, especially in cases where two or more, persons after partaking of food in company are attacked by cholers in quick succession a groundless suspicion of arsenical, poisoning arises The chief points which distinguish arenical poisoning from cholera are (1) The presence in the former of blood in the stools, (2) The absence in the former of the ricewater appearance of the stools, characteristic of cholera (this appearance may, however be present in the later stages of arsenical poisoning), and (3) In cholera pain in the throat does not precede vomiting, while in irritant poisoning the reverse is the case. The prevalence or absence of cholera in the locality at the time may also serve as an aid to the diagnosis. Cases where the arritant symptoms are slight are sometimes not recognized during life as cases of poisoning

In chronic cases persistent gastric irritation not yielding to treatment accompanied by numbness and tingling of the textremutes, with tendency to paralysis, should arouse suspicion, and indicate the necessity of subjecting the urine or other executions to analysis. It may be mistaken for Addison's disease and heriteri.

Cases - Arsenic poisoning mistaken for cholera. - (1) In 1899 n Mohammedan woman, aged 26, died after violent purging and vomiting the deceated, however, suspected foul play and informed the police, who caused a post mortem examination to be made. The stomach and intestimes were reported by the Assistant surgeon to be "healthy, the formul containing some fluid of a rice water colour, ' and he attributed the cause of death to cholers, but forwarded the viscers for chemical examination as the case was suspicious. Arsenic was detected in the viscera, also in the stains of vomited matter on the clothes of the woman and in the earth taken from the spot on which she had somited. The police then arrested the husband of the deceased on suspicion and had the house searched. A glass phial was found in which a large quantity of white arsenic, in powder, was detected mixed with sugar and lose water, which were probably added to mask the supposed acrid taste of white arsenic (2) Two other fatal cases of arsenic poisoning alleged to be cholera occurred in 1899 in Backerguage -The civil surgion in forwarding the viscera of two Mob unmedan women, aged 40 and 20 stated that the police report -"The two deceased voinited, purged and expired It is suspected that some sort of poison had been administered with the food mortem examination detected nothing abnormal in the stomach and intestimes which were found to be "healthy and containing digested food," he ascribed the two deaths to cholera. On chemical examination very marked quantities of argenic were detected in the viscers in both cases, and arsenic was also found on the clothes and beddings stated to have been soiled with the voinit and purging of the two deceased. These three cases are of medico legal interest tirstly, from the close resemblance of the symptoms to cholera, with which disease homicidal arsenic poisoning eases have been mistaken even by experienced medical men and secondly, in the entire absence of uritant signs in the alimentary canal L. A. Waddell, Beng Chem. Fz. Rept., 1899 (3) A woman died in Jessore in 1900 with counting and purging which was reported as cholera, but the police on certain information sent the viscora for examination, and arsenic was detected in them -C L Bove, Beng Chem Lx Rept, 1907

Interval betieen swallowing the poison and first appearance of sympton's —This is usually half an hour to an hour Cases, however, have been reported where the symptoms appeared almost immediately Taylor' mentions a case where the symptoms came on while a man was in the act of eating a case containing the poison. I once met with a case where the symptoms appeared while a man was diruking a cup of tea made with where from a kettle into which arsenious ovide had been introduced. On the other hand, a few cases are reported in which this interval has been delyied to two, to eight or nine hours. In some of these cases the prolongation of the interval is difficult to account for an others at appears.

to have been due to fulness of the stomach, to sleep, or to intoxication (see Cases below), and occasionally there are almost no symptoms (p 486)

Cases -Arsenical noisoning, delayed symptoms -(a) (Christison on Poisons p 299) A man took seven drachms of arsenious oxide at eight in the evening went to bed at half past nine and slept till eleven when he awoke with slight pain in the stomach vomiting and cold sweats-he died in nine hours -(b) (Beng W R. for 1870 72) The persons members of the same family were poisoned by sweetment containing arsemous oxide, one of the five a child of four was roused from sleen to partake of the sweetment an I fell asleep a min afterwards in her case the symptoms did not appear for two and a half hours while in the other four-all adults-the symptoms appeared in about an hour Two of the adults had not supped previous to eating the sweetment-both these died The other three individuals had just finished their evening meal and all three recovered -(c) (Woolman and Tily For Med p 163) took to of arsenious oxide after a me il to symptoms appeared for eight hours when rain vomiting and purging set in the stomach pump was used Pesult recovery -(1) (Christison on Posso is, p 308 one of the fourteen ca es referred to under 9) The subject was a man so addicted to drinking that his daily allowance was a pint of brands. When first seen there was so much tranquillity that doubts were entertained whether arsenic halreally been swallowed but at length he was discovered actually thewing it. This state continued for nearly five hours when some vomiting ensued Col lness of the extremities and spasmodic flexion of the legs soon followed and in a few minutes more he expired --(r) (Ib p 800) A man swallowed three drachms of arsenious oxide then went about for two hours bidding adieu to his friends he was then persuaded to take emetics which cause I free and easy comiting, he hardly suffere I at all for five hours but died nine hours after taking the porson

Fatal period —In acute cases this is usually under twentyform hours. In many cases, especially those in which marked
nervous symptoms appear early, death takes place in under
twelve to fourteen hours. In one case a young man tied with
tetanic symptoms in twenty minutes, this is the shortest
fatal period recorded. Longer fatal periods than three days
are sometimes met with. Taylor mentions cases of death
in six days seven days fifteen days and sixteen days. In
one case (a woman accidentally poisoned by external application of a solution of arseme), death did not occur for two
years

Post mortem signs—Gastric microis membrane is usually reduced from inflammatory action and his been found so even where the poison has been introduced by channels other than the mouth. It has been found intensely inflamed even when death has taken place within two hours after swallowing the poison. It may be reddened in patches, or

<sup>&</sup>lt;sup>1</sup> Taylor Poisons p 308

the redness or homorrhages may be punctiform or structed in appearance or the whole mucous membrane may be deep red with dark petechi or ecclymosed spots from underlying extravasated blood Frequently the inner surface of the stomach has a corrugated appearance, and is covered with tenacious mucus entangling particles of the poison if the latter was given in solid form Its contents are often dark in colour from altered blood When arsenic is given as a powder, some ... times minute specks or patches of whitish or vellow powder (due to conversion of the white arsenic into vellow sulphide) are formed embedded on the surface of the mucous membrane of the stomach or intestines and each speck may be the centre of inflammatory patch. The redness and patches sometimes extend into the duodenum, more rarely the intestines are found inflamed throu hout their whole length Commonly the rectum is found inflamed. Ulceration of the gastric mucous membrane is not common but has been found in case of death in ten hours Perforation of the stomach is very rare but is occasionally found (see Case below) Sometimes in fatal cases the stomach and intestines show little or no signs of inflammatory action, this has been observed even in a case where well marked irritant symptoms were present during life Homorrhage beneath the endocardium especially of the left ventricle, in the form of dotted petechias or in larger patches is extremely characteristic and has been found by Gibbons and Powell in forty three of sixty cases of acute poisoning This is a very valuable slan

Out of thirty three cases in which the condition of the heart! was need in eight only was the endocardium foun! natural Congestion of the brain lung kidneys or liver is sometimes met with

Assence everts a marked antiseptic action on the tissues and hence in fital cases post morten appearances of gestine-irritation may remain recognizable for a considerable period Post morten appearances indicative of duri from areasence poisoning have been found coupled with post morten appearances pointing to duath from mechanical violence (see Case p. 215), and even in bodies found, under uncounstances which pointed to doubt by drowning.

Cuses —Perforation of the stomach in argenical poisoning —This was reported in two of the three hin fred and five Bombay fatal cases. In a case reported by Dr. R. H. Batty, in this case a woman of about

thirty five after a quarrel with her husband smallowed a quantity of arsenious oxide. Duration of case not stated I ost morter is appearances, much congestion of the membranes of the brain also of the brain lungs kidneys and liver Heart normal Œsophagus pale. Mucous membrane of stomach intensely red with white particles adhering to it Stomach perforations very minute the third about the size of an ordinary quill from the latter a long roj y mucous substance was protruding in which there was a large quantity of minute white particles of arsenious oxide Smalli intestines very red throughout and containing particles of solid arsenious oxide.

Cate—Areancal posoning with absence of inflammation in the storanch and intestines—Christison besides the fite cases menhoned gives two other cases in which on j ost mortone examination the mucous membrane of the storanch and intestines was found to be free from signs of inflammation (IBL) and I have met with one other case cout of three hundrel and five) in which only trifling signs of inflammatory action were present. Harvey (Beng M R for 1870 72) records absence of signs of inflammation in four cases out of one hundred and ninety one. In one of these cases the symptoms were voimting purging dryness of the mouth thirst animity vertice and prostration. Death occurred in nine hours. In this case the whole of the intestinal tract was found healthy.

Treatment -(a) Elimination This should be chiefly relied on Vomiting should be encouraged and conious draughts of warm water given or better emetics or the stomach pump Arsenic is rapidly voided by the urine (b) Prevention of action by antidote Hydrited ferric oxide should be given in considerable quantity Thirty two parts by weight of this antidote are required to render insoluble one part by weight of arsenic oxide The antidote must be freshly prepared, as it loses its power if kept for any length of time To prepare it a quantity of a solution of a ferric salt, eg ferric chloride should be either rubbed up in a mortar with mag nesia or precipitated by solution of ammonia in the latter case the precipitate must be washed on a calico filter before administration (c) Counteraction of effects This indication must be carried out on general principles Demulcents should be given to allay irritation and other symptoms treated as they arise

Fatal dose—The smallest fatal dose for an adult bitherto recorded is under two grains of Arsemious Oxide—It was the case of a woman who took half an ounce of Fowler's Solution (Arsenite of Potassium) during a period of five days in unknown doses and she dued by syncope without vointing or purging but the stomach and intestines were inflamed (Castle, Prov. Jour. 1848–347)—In another case two and a half grains of Arsemious Oxide contained in two ounces of 'fly paper' killed a robust healthy girl, aged nineteen, in thirty six hours (Taylor II, 482)

Hence under curcumstances favourable to the action of the poison the fatal dose for an adult may be estimated at two to three grains of arsenious oxide Cases of recovery under free counting are recorded from doses of one to two ounces of arsenious oxide In one very exceptional case of recovery from a large dost (Case below) the person swallowed-two masses of arsenious oxide weighing together 105 grains-was passed per anum Persons in the habit of taking small doses of arsenic daily may gradually increase the quantity until able to swallow as much as four to six grains of arsenions oxide without experiencing symptoms of poisoning. This habit of argenic eating is practised by the peasants of Styria under the belief that it improves the kin and increases the respiratory powers, the same habit prevails to a certain extent in the Lapiah arsenic being there eaten either as an alternative to comm eating or as an aphrodisiac 1

Car — Aram cal posonnes—Exceptional recovery — A Barser al mutted into the lamnet to elegate by 100 yail all Bombay, had swallowed two naives of a carson coale. Stricts hours afterwards in spaced per rectum a massification so order we plant gughty are as and don't forty five hours after as allowing the poson ic. in the same way passed a smaller mass weighing fewers five from a The samptions present were comparatively slight there was no vomiting but some diarrhau a he was drowsy, his yes a vera suffished and i a complained of I endaches and pain in the ablomen. He leys the hospital quite well —Ind. Med. Ga., 1872 p. 188

## Forms of Arsenic used as poisons in India

These may be (1) White Arrenic or Arsenicus Ovide (2) Arsenite of cotassium or Sodium (2) Copper compounds pigments (3) Arsenic Acid (5) Sniphida; (6) Chlorides (7) Arseniuettee, Hydrogen (8) Cacodylates of Arsenic as anti vrohilde rejudents

In the great majority of cases arsonious oxide is employed, in a few the sulphydes (orpiment and resigns) are used either alone or mixed with arsonious oxide and exceptionally the arsenites of comer \( \).

## ARSENIOUS OXIDE.

Common white a senie is known in the vernacular as Sankhya' Phalkya sorval or Somul Lhar This is yearly imported in large quantity chiefly from the Persian Gulf and

<sup>1</sup> M d Jur p 117 or the couch shell from the vi teous lustre of the lumps of crude arsent.

, is readily purchasable all over India The chief legitimate uses to which it is put in India appear to be as follows —

(1) As a preservative agent, especially for wood. Observes menhous that with this object it is thrown into the holds of vessels, and placed round wooden foundation piles and applied to the woodwork and walls of houses. (2) In preserving and preparing the thicker kinds of skins for leather, and to a certain extent for preserving skins generally. (3) By goldsmiths in gold working. (4) For the purpose of destroying risk and other vermin. (5) Wedicinally, internally as a cure for fevers, syphilist, and other diseases, and externally as a pransiticed and deplatory, especially among prostitutive, and as a healing outment for sores in horses and cattle. It has already been mentioned that it is used to a certain extent in the Panjab, as an alternative to opium eating, and as an apphrodisace.

Homicidal use.—Of all poisons arsenious oxide is the one by far the most frequently employed in India for homicidal purposes When so employed, the vehicle is most commonly

sweetmeat or bread or other food

Sweetment, poisoned with arsenic, often consists of but little more than sugar or 'gur' (coarse sugar), and coarsely pounded arsenious oxide Often a club or stick and a piece of flat board, or a couple of stones, are used for pounding the arsenic, and particles of the poison are found adhering to them. When bread is the vehicle used, the coarsely pounded arsenious oxide is often simply placed between two layers of or mixed with the , dough Sometimes, however, it is ground up with the flour, and the grindstones are found to have particles of the poison adhering to them In some cases it is the person grinding the flour who adds the poison to it, in others, the poison is put into the handmill by another during the temporary absence of the person using it. Sometimes the vehicle is cooked vegetable food, eq cooked rice, pulse, etc , also, in cases of alleged poisoning, arsenious oxide is found in sweet oil, in tam'irinds, in 'chuna (lime) used with betel nut for chewing, and in one case it was found mixed with realgar in a 'biri' or native cigarette Very often the quantity of the poison added to the food in

a homicidal case is very great (see Case, pp 495-6), much more than chough to kill several persons, and the particles of arsenious oxide large enough to be clearly visible and weighing several grains (Case, p 515). Arsenious oxide when used for homicidal purposes, is generally used alone. It is, however, found sometimes in food with the sulphides of arsenio, with sulphate of copper, with mercuic sulphide, with sulphate of rich and the Sarod case (p 496) it was found mixed with diamond dust. Frequently in one and the Same case.

This was so in 89 out of the 507 cases of arsenical poisoning reported. To the Bourhav Chemical Analyser, during the ten years ending 1884. Some of these 88 cases of multiple poisoning appear to have been, however, the result of accident In multiple homicald cases, very frequently some of the victims are children. In one exceptional year (1878-79), out of thirty eight persons reported to the Bourhay Analyser's Office, as ha inghed from aroune poisoning during the year twelle were children.

The motives in India most commonly leading to homicidal poisoning by argenious oxide appear to be revenge and sixual massion

Common types of the crime are (1) A, at cumity with B, gives him (see Case below) or his children (see Cases, p. 495) some poisoned sweetmest, or introduces arsenious oxide into his food, of which often others as well as B partake. As a result a number of persons, often the members of one family, children as well as adults, are porsoned (see Cases (d) and (c). p 495), or (2) a wife, being anxious to get rid of her husband. puts arsenious oxide-often supplied by a paramour-into her husbands food In some cases where husbands are poisoned by their wives, the motive is not homicidal, but connected with the belief in the aphrodisiac virtues of arsenic before referred to Thus in a case where a woman confessed to having nut a white powder (afterwards found to be arsenious oxide) into her husband's food, she alleged that the powder was given to her as a charm or medicine, 'to increase her husband's love for her' In Case (a) p 496, this belief also may have led to the administration of the poison Case (b) p 420, is a curious example of a poison prepared for a particular individual, going astray and poisoring others It is seldom that in India acquisition of money or property forms the motive for arsenical possening' When they t is the object, datura (which see) is the poison asually engloyed One or two cases of road robbery in which arsenious (vide was the poison used have, however, been reported in exceptional case, also superstition leads more or

less directly to arenical poisoning (see Cass (c), p. 497)

It should be borne in mind that the case with which arsenious objude can be obtained in Indra, and the difficulty of tracing its jurchase, tends not only us merese the frequency, of its use for homicial purposes, but also to facilitate the fabrication of false charges of attempted poisoning by surpreparations manufactures in measure into evaluate segundar, it must be recipileted that an individual, while in custody,

<sup>&</sup>lt;sup>1</sup> Reng We too he et Reje for 1870-2 states that of 203 cases of posening y anemous acid occloring in Bengal N W Provinces Oodh and the Tunpal luring the time years fourteen were cases of multiple poisoning and et inlet/seren cases of rapical poisoning reported to the Chemical Analyses, Judeans in the truty years, 120-5, twenty its ween multiple access.

may from fear make a false confession of posoning. In Case, 1. 497, there is little doubt but that such a false confession was made.

Cases -Arsenical poisoning-large quantity -(a) (Bo Chem Analuser's Rept , 1872-78). In a case tried before the High Court, Bombay. it was proved that a man went up to another, a police sepoy, while standing on duty in the public streets, and offered him some sweetment He took it, bit off a mouthful, but finding it to have a critty taste, spat it out. From eight hundred and sixty grains of the remainder, I extracted six hundred and ten grains of arsenious oxide. The police sepoy, it was stated, had run away with the wife of the man who attempted to poison him -(b) (Rept., 1874-75) In a case from Ahmednigar, in which a man died in twelve hours after eating some poisoned bread, 5] lbs of the bread were found to contain one thousand five hundred and fifteen grains of arsenious oxide -(c) (Rept., 1878 79) A woman was seen feeding two children, at respectively four and six, with sweetment, both children died. The stomach of the elder child contained one hundred grains of arsenious oxide, and arsenious oxide was found in relatively large quantity in an unconsumed portion of the sweetment. The motive in this case was stated to be a quarrel with the parents of the children -(d) (Rept , 1882-83) I are persons, two adults and three children, inmates of a leper hospital in Bombay, were poisoned by sweetment con taining arsenious oxide to the extent of about twelve grains per ounce A large quantity of tamarinds was given at the same time to the same The tamarinds contained about fifty grains per lb of arsenious oxide Some of the fragments of arsenious oxide contained in the tamarinds were as large as small beans. The motive in this case, it was stated, was to get rid of a leper husband, whose wife the accused wanted to marry

Cases -Arsenical poisoning-Homicidal multiple cases -(Bo Chem Analyser's Rept , 1880 81) -(a) In a case from Uran, a man and his wife and two children were all four poisoned by arsenious oxide contained in bread, given to them it was alleged, by a neighbour who had a quarrel with the family Two of the four died -(b) In a case from Hyderabad (Sind), three children were poisoned by sweetment containing arsenic. given to them, it was alleged, by a man at enmity with their parents One of the three, a haby, appears to have been porsoned by sucking the fingers of the other children -(c) In a case from Ahmednagar, four per sons, one of whom died, were poisoned by arsenious oxide contained in food In this case the accused was, it was said, on bad terms with the persons por oned, and was seen seated near some cooking pots in which their food was being prepared, leaving just as they were about to com mence their meal -(d) (Rept for 1879-80) In a case also from Abmed nagar, two children, both of whom died, and three adults were portoned In this case it was alleged that the aunt of the children was the poisoner She was seen, whilst the food was being cooked, of which the persons poisoned afterwards partook, to throw something into the pot containing it, and was known to have recently purchased arsenic -(\*) (\*b ) In a case from Hubli, it was reported that a man took some flour from a woman who was grinding it, afterwards throwing it back on to the handmill she was using. The woman having cooked the flour, she and her family partock of it all were attacked with symptoms of irritant poisoning, all, however, recovered -(f) (Rept , 1881-82) In a case from Kaira, a man, it was alleged, gave some sweetment to another, with a request that he would give some of it to others that he named, saying that it was a 'prasad'

(offenne) of a godlas. The man to whom the sectment was given, retaining some for himself, distributed the rist to the person ransol, and these again gave some of it to thin other persons. All who persons to the save times traffered from the unal symptoms of irritant, many two bits we cherically the other on the saith day—(g) (from times the same times of the save times of the save times of the save times of the save times of the save times the save times of the save according to the save times of the save time

Case - The Baroda Case - In this case ' Colonel Phayre, the Resi dent at Barola, expenenced one morning a feeling of nausea, accom-panied by salivation, and a peculiar taste, which he described as metallic. these symptoms came on about half an hour after he had swallowed a small quantity of sherl et made of pumalo juice. Hastily concluding that the sherbet was bad and had been the cause of the symptoms, he threw it away, but in the act of replacing the tumbler on the table, he noticed a sedunent lying at the bottom of it This sediment was proved, on analysis, to consist of arsenious oxide, mixed with finely powdered diamond, -Dr Wellington Gray, Bo Chem Analyser's Rept , 1874-75 It was alleged that this attempt to poison Colonel Phayre was instigated by the then Gaikwar of Baroda and a Court of Inquiry was held. One of the Residency peons was suspected of having introduced the poison into Colonel Phayre's sherbet. On searching this man, a packet of arsenions On searching this man, a packet of arsenions oxide was found in lus belt, and a sore was found on his skin, in such a situation as to make it possible that it had resulted from continued con tact with the arsenic

Oases -Arsenical poisoning, exceptional cases -(a) (Be. Chem 4nalyser's Rept for 1884) In a case tried before the High Court, Bombay four men were charged with the murder of a young dancing girl The evidence went to show that one of the accord was deeply in love with the girl, who, however had rejected his addresses. On this the lover called in the assistance of the other accessed regions, and asked them to prepare at least, so it was proud for the defence—a lave philtre, to be given to the girl, which would cause her to look favourably on his suit The result was that a number of sweetmest balls were propared and distributed, with some ceremony, at an assembly where deceased and others were present. Apparently one of these sweetment balls contained poison, viz the one given to the deceased, as she and her brother to whom she had given a portion of the ball handed to ber, were the only persons who suffered from symptoms of irritant poisoning, After death twenty grains of arsenious oxide were found in the contents of deceased a stomach. On the whole the evidence in this case was not inconsistent with the view that the theory set up by the defence was true, and that there was no morderous intent -(b) (ib for 1878-79) history of a case from Gadag in which four persons-two children, who died, and two adults, who recovered-were poisoned by ar-enious oxile, was thus given by the a-sistant-surgeon in charge of the dispensity -"The mother of the deceased children obtained three small sweetment balls from one of her paramours, with the object of administering the same to a man named Dushrath Sonar, who was also in love with her. The man who prepared the balls, and gave them to the woman, ctates

that he mixed some kind of white powder with the balls. The powder was procured by him from a mendicant Byragi (Hindu ascetic), and the sweet meat balls were made especially mixed with the powder to poison Dusl rath Sonar, but the woman instead of giving them to the Sonar to eat, kept them in her house During the absence of the woman from her house on some business, her mother happened to find the sweetmeat balls, and, not knowing that they were poisoned, gave two of them to the children to eat, the third ball was eaten by herself and her other daughter, who was in the house' -(c) (ab for 1876 77) The history accompanying a case from Amraoti was as follows -" A man lost some ornaments, and suspected his sister of stealing them Under the advice of a 'wise man, he put outside his door a copper pot, with a lump of cowdung in it, advertising his friends that he had done so, and that if the thief put the ornaments into the pot, nothing further would be said. This fuled. The wise man' thereupon assembled the neighbours, and an or leal was instituted, each person being required to cat a small quantity of sugar was that the sister died with symptoms of irritint poisoning and one and a half grains of asenious oxide were found in the contents of her stomach

Case —Apparently false confession of arsenceal porsoning —In a case irom Nasik a man duel suddenly, and his brother accussed deceased a wife of poisoning him. The wife was taken into custody, the body disinterred and examined no signs of irritant poisoning were found. The biscera were forwarded for analysis. In the meantime the wife while in custody of the police, confessed to having put arsence into her husband a food and some white substance stated to have been produced by her, was on examination, found to be arsenious oxide. On analysis however, not the slightest trace of arsenio could be found in the viscera of the deceased — Bo Chem. Analyser's Ref. 1884

Case -Arsenical poisoning -Homicidal -- Large quantity of poison found (Brown and Stewart, Treals for murder by Poison, p 358) -(a) Dr Christison the great toxicologist writing to the Edinburgh Medical Journal, December, 18.7, cited a case undoubtedly one of murder, where between 90 and 100 grains of arsenious oxide were found in the contents of the stomach of an adult The poison was administered in whishy punch, with sugar, the arsonic being kept in suspension by constant stirring Professor Christison's letter had reference to an argument put forward for the defence in the Madeline Smith case (Edinburgh, 1857) namely, that as eighty eight grains of arsenious oxide were found in the contents of the stomach of the deceased, and some of it in hard gritty crystalline particles, and there had been vomiting and purging the case must have been one of suicide, but the quantity found amounted to no more than half a teaspoonful, an amount which could be readily adminis tered with solid food in some thick liquid. Another argument of the defence was that the arsenic purchased by Madeline was mixed with soot, while no soot was found in the stomach or intestine of the deceased --her quondam lover.--and a girl was unlikely to know how to remove the soot from the arsenic-verdict was 'not proven' (b) and (c) Taylor (on Poisons, p 157) mentions two other cases, both charges of homicide, in which, after death, the quantity of arsenious oxide found in the stomach was large viz Reg v Dodds, in which 150 grains were found, and Reg v Hewett, in which 154 grains were found

Case —The Agra Case —Clark, an officer of the Subordinate Medical Department, was charged in 1912 with the murder of Mr Fulham, whose medical attendant he was and with whose wife he had an intrigue

2 1

498

I oncome, was suspected and evidence given that the prisoner had large quantit es of Gelemium Chemical examination failed to detect any alkaloid, but traces of arsenic were found in the thigh bone The accused was found guilty and suffered the death penalty

Abortifacient use.—Aremious oxide is sometimes given or taken with the object of causing abortion, usually with fatal results 1

In one case in Bombav in 1883 post mortem examination of a female four months advanced in pregnancy disclosed a mass of paste containing arsenious oxide, lying in the upper part of the vagina near the os uten

Succidal use—Succides by posson in India usually select opium, but a certain number use areautous oxide. It would appear that in Bengal, N.-W Provinces, Panjab, and Oudb, about one third of the fatal cases of arsenical possoning are suicidal, but that for one suicide by opium? In Bomby also, about one third of the fatal cases of areanical possoning respected to the chemical analysers office appear to be suicidal, and these suicidal cases about equal one tenth of the total number of suicides by posson shown in the mortality returns for the whole presidency. Sometimes in suicidal cases the quantity of arsenious oxide found after death in the contents of the stomach is very large.

Taylor refers to a case where the quantity found was four ounces. In one case of suicide, at Bombay, 360 grains were found and several times, over 100 grains were found. The discovery in the contents of the stomach after death of a large quantity of arsenious oxide to a certain extent indicates the probability of suicide. It however, by no means negatives homicide, especially in India, where very large quantities are given, or attempted to be given, in homicidal cases. In Cases (a)—(c), p 495 the quantity found was very large Case (a) p 469 is still more conclusive on this point, the victim being an adult instead of a child. Taylor also mentions two other cases both charges of homicide in which the quantity found was large (see Cases (b) and (c) p 497)

a surface (accounts (a) max (a) L vol)

Accidental cases —Accidental poisoning from internal administration of ar-enious oride is sometimes met with, generally from the poison being mistaken for some metr mineral substance (see Case, p. 499) become by carelessness or accident mixed with articles of food. The possibility also that in some cases arsenious oxide is intentionally administered

L Beng Medico legal Rept 18"0-72 \* Ibid.
Liked Jur., IL., p 270

without actual homicidal intent has already been alluded to

(see Case (a), p 496)

External application of assenious oxide also occasionally causes fatal poisoning (see Case below) In another case inferred to above, in which death did not take place for two years, the poison was applied in solutions to the skin for the cure of itch, its application being followed by an erysipelatous cruption Cises (c) and (b), p. 500, are additional examples of this form of accidental poisoning. It may be here pointed out that the continued application of arsenious oxide to the unbroken skin, may cause an erysipelatous or eczematous eruption thereon. This may be followed by denudation of the epidermis, and sloughing and ulceration owing to the crustic action of the poison. The question as to what effect long continued application of arsenious oxide has on the unbroken skin arose in the Baroda case (p. 496).

Care—Arrencal Pousoning by Puncture—A Bengali had serotal tumour, and had been suffering from themnatic fever for about a week A person named Satvabadi Mangraj, ostensibly in the endeavour to cure the man, punctured the tumour, and applied some irritant or poisonous drugs to it from the effect of which the man died. The left testicle and portion of the scrotum of the deceased which exhibited puncture marks, were forwarded here for examination and arsene was detected in them—I. A Waddell, Beng (Hom Ex Lept 1897)

Accidentally in food —Cases —(a) In Bombay some years ago, a number of school children were poisoned by swallowing portions of a mass of arsenious oxide which they had found lying on the ground —(b) (Bo Chem Analyser's Rept., 1873 74) Five lumps of aisenious oxide weighing together 128 grains were found in the stomach of a woman who died in the Jamestjee Jeejeebhoy Hospital Bombay Her story was that she had eaten the arsenic in mistake for 'khadu' (pipe clay) "Khadu exting seems to be a common practice among Hindu females -(c) (Taylor, Poisons p 354) In the Bradford lozenge case a confectioner intending to a lulterate lozenges with plaster of Paris mixed with them a quantity of white arsenic, which had been supplied to him through mistake More than 200 persons were poisoned of whom seventeen died -(d) In tea and coffee -Mr C-, a resident of Bow Bazar, Calcutta, and his family and cook were sezed in 1899, with symptoms of irritant poisoning after partaking of tea and coffee prepared by his cook. The only one who escaped was a child who took some of the warm milk with which the tea and the coffee had been prepared, but none of the tas or coffee. All members of the family, with the exception of this child, showed symptoms of irritant poisoning vomiting and purging, and pain in the abdomen. The nephew and the cook suffered most severely, and were removed to the Medical College Hospital, where both of them died The others recovered. The viscera of the cook was forwarded for examination, and arsenic was detected in them. A large quantity of white arsenic was found as a deposit in the Lettle in which the water was boiled, and this was evidently the source from which the tea and coffee became contaminated with the poison. Arsenic was also detected in the yessels in which the coffee and tea were prepared, as well as in the coffee decoction Neither the milk nor the sugar contained arsenic, hence the child escaped

As to how the arsenic was introduced into the water kettle nothing could be ascertained It was believed to be accidental, put in instead of soda to soften the water, especially as several cooks keep white arsenie in their kitchens to kill rats and cats —(c) In bread —A Mohammedan of Bow Bazar, Calcutta found a poor woman of the neighbourhood sitting weening at her door and on his inquiring into the cause of her distress she told him that she and her children were starving, and she had no means of getting food that day The man, patying her, bought five seers of flour from a shop close by, and made it over to her with a few pice to enable her to buy other necessaries The woman prepared some chapatis (cakes) with a portion of this flour, and shared the bread with her two children and two co lodgers. They all soon afterwards suffered from symptoms of irritant possoning and were removed to hospital, where their stomachs were washed out, and they were treated for irritant poisoning. They all recovered. The remaining changis and flour and the storach washings of all these persons were forwarded for examination. White arsenic was detected in the chapatis and arsenic was detected in the stomach washings. The flour from which the chapates had been made contained no arsenic How arsenie came to be mixed with the chapatis remained a mystery Mearly all Mohammedans keep arsenic in their houses as a depilators, and the poison is sold in the bazaar by the same shopkeepers who sell spices and salts. The risk therefore of this deadly poison finding its way need dentally into the food is very great -L 1 Waddell, Beng Chem Ex-Acpt , 1899 -(f) As Love-Charm -A young Mohammedan wife, aged 14 years who was in the habit of running away from her husband had administered to her by the latter some drug as a love-charm with the object of causing her to love him and from the effects of which she died The civil surgeon hading some of the internal organs congested the mucous membrane of the intestines slightly congested in parts, and con taining about two ounces of rice water stools ascribed the death to cholera and did not send the viscera for chemical examination. The police however sent the vomited matter for analysis and arseme was detected in this as well as in the sugar which had been given to her -L. A Waddell, Beng Chem Iz Lept 1884 p 9

Cases - Arsenical poisoning by External application -- (a) (Taylor, Possons p 301) The mother of a girl at nine, rulbed some white precipitate outment mixed with arsenic, on her child's head, in order to kill vermin No symptoms appeared until the fifth day, when the child seemed unwell and complained of thirst. There was slight purging with cramps on the eighth day Death took place on the tenth day On post mortem examination inflammation of the mucous membrane of the stomach and duodenum was found .- (b) (Taylor s Manual, p 99, and Blyth, Poisons p 510) In 1876 a number of infants were poisoned in England by arsenious oxide contained as an adulterant in violet powder bome of the powder was found to contain over 88 per cent of As,O, one case reported by Mr Tidy the powder was applied to the skin of a newly born infant at interval, for three days. The skin became intensely red, and ultimately in some parts assumed a sloughly appearance. The child died on the tenth day -(c) (Taylor Poucous, p 11) Two shep herds were engaged in sheep dipping for nine hours, using a mixture of arsemous oxide and solution of carbonate of potash. Both suffered, one on the fourth day after the dippang had eczems of the scrotum, and visicles on the thighs, slight fever and great thirst Dr Watson, who reported this case states that other shepherds even when using As, O, only, suffered from eruptions, chiefly on the hands, forearms, scrotum, and thighs

Case—Arsense poisoning by post—In August 1899, Mr P.—
P. W D., Shwebo Burma received a postal package from Rangeon con
tuning a bottle of beer. He opened it and temg apparently suspicious
showed it to his native servant who took, a teaspoonful and shortly
afterwards became desperately ill. The contents of the bottle on being
examined showed that the beer was charged as full as possible with
arsenic. About the same date Mr Green of the Telegraph Department,
Bhamo received from Ringoon by post a packet of cocoa. When he
opened it he saw arsense and handed the packet to the police. The
packet has now been anylyzed and shows enough arsense in one spoonful
to kill half a dozen men.—Enalishman 18th August 1899.

Cattle-poisoning by arsenious oxide—A large number of horned cattle are yearly poisoned in India 1 With very few exceptions the poison used is arsenious oxide. Thus in Western India arsenious oxide was found in 714 out of 743 cases of cattle poisoning reported to the Bombay Chemical Analyser's office during the ten years ending 1885 Nearly always where the animals killed are horned cattle they are poisoned for the sake of their skins? The usual plan adopted is to make some powdered areenious oxide into a paste with oil and insert a mass of this often wrapped in paper, into a cavity scooped out of a head of jowari or other grun or enclose it in a bundle of grass. In a few cases the arenious oxide is mixed with one or other of the following orpiment realgar red lead litharge or pounded glass Cases of horse poisoning also sometimes come under notice The motive for these appears generally to be to gratify spite against owner of the animals In one case of horse poisoning occurring in Bombay a native gentleman lost seventeen horses in three The bodies of the first fifteen were not examined, but the sixteenth and seventeenth were both found to have been poisoned by arsenious oxide. The symptoms caused in cattle by administration of arsenious oxide and other poisons are similar to those in human beings

Form —Arsenious oxide is met with in the form of (a) white masses looking somewhat like lumps of white eartherware these are at first translucent but become opaque by keeping, (b) A more or less fine powder composed of irregular-shaped fragments obtained by mechanically powdering form (a), and (c) A fine powder composed entirely or almost entirely

<sup>1</sup> In 1824 283 head of cattle were reported to the Indian Chemical Examiners as killed by po son In Bombay 677 animals almost all horned

cuttle were killed by poison during the ten year end up 1884.

\*By Characra or Chakdra fleather workers) or by Mahars or Dhers
([Paralis]) who claim the bodies of animals dying of disease Gribble remarks
that he has found ordering the bodies to be buried in quicklime affectably
stops cattle poisoning in districts where this crime prevails—Med Jur
p 212

of minute crystals Forms (a) and (b) are the forms in common use in India, form (c) is only occasionally met with

The difference in appearance under the micro cope of forms (b) and (c) was a matter of much importance in the Cas. over page. Powdered arsenious orbite is usually met with in England coloured with soot or indigo as directed under the Arsenic Act (14 Vic cap 13)<sup>1</sup> and in case of poisoning it may be of importance to note the nature of the colouring matter found mixed with the arsenious oxide.

Case -The De Ga Case -- In this case a number of the members of a Portuguese family of position resident in Bombay were poisoned by arsenic. The circumstances of the case were as follows. A man believed to be a Hindoo who afterwards disappeared and has never been traced. left at the family residence in Bombay a present of cakes Some of these cakes were passed on to another louse, where other members of the family resided and these in their turn sent a portion to a third house. All who partook of the cakes suffered three died. The cakes on exami nation were found to contain an interior Liver of junt mixed with a quantity of coarsely pounded arsenious oxide. In the course of the police inquiry into this case suspicion arose that the po son had been abstracted from a partie ilar drugg at a shop in Bombay It however turned out that the only arsenious oxide in this shop was a mantity contained in a jur A portion of the contents of this jur submitted to me for examination proved to be entirely composed of minute unbroken crystals much smaller in size than many of the fragments of arsenious oxide contained in the cakes. Hence it was highly in likely that the poison found in the cakes had b en obtained from the shop in question— Bo Clem Analysers Rept 15:2-79

#### Properties

Taste either absent or slightly roughish or sweetish not strongly metallic as is the case with many white irritant poisonous powders or acid like exalic acid. Specific gravity



Fig. 28 -Sublimate of Arsenious Oxide Crystals x 100

rbout 37 A punch of powdered areantous oxude weighs about 17 grains, a resignantial about 1.0 grains and a tablespoonful about 530 grains—Taylor Solubility—Cold water dissolves about hilf a grain to a grain per onner. Boiling water dissolves more and water toiled for an hour with it will take up

<sup>1</sup> tithough the Sale of Possons tet has been in force in Bombay for nearly twenty years I can only recollect one case in which on examination I found powdered arsenious oxide mixed with one of the colouring materials mentioned in s 1° of the Bombay Act —1 B L. 1883 about 12 grains per ounce 1 A much larger quantity of powdered arsenious oxide than this may, however, be suspended in mucilaginous fluids When finely powdered arsenious oxide is mixed with water, a small quantity rises to the surface and floats thereon, forming a film The fact that such a film was observed on a particular fluid supposed to have contained the poison administered, may be an important piece of evidence Alkalies and alkaline carbonites, owing to the formation of alkaline arsenites, augment, and, according to Taylor, organic matter as a rule decreases, the solubility of the poison Arsenious oxide is very soluble in hydrochloric acid. Effect of heit -Solid arsenious oxide when heated volatilizes without charring or fusion Its vapour, received on a moderately heated surface. condenses in minute crystals of characteristic appearance, the majority of which are more or less perfect octahedra (see Fig. 28)

Detection.—(1) By the effect of heat on the solid as stated above (2) Boiled with water the solution of arsenious acid so obtained (a) acidulated with hydrochloric acid yields a vellow precipitate with hydrogen sulphide, soluble in solution of

ammonia, (b) yields a yellow precipitate with ammonio nitrate of silver, 2 (c) gives a green precipitate with ammonio sulphate of copper. 3 and (d) the solution (or the powdered solid) boiled with nitric acid and the fluid evaporated to dryness yields a residue of arsenic acid which when dissolved in water gives a red brown precipitate with solution of silver nitrate (3) Powdered arsenious oxide mixed with powdered charcoal and powdered sodium carbonate.4 and heated in a narrow tube (the 'Reduction process') see Fig 29, yields a sublimate of metallic arsente as a ring, hair brown in colour where the film is thin, and dark grey or black and lustrous where thicker Such a ring cut off and heated in a wide tube Fig. sublimes readily with formation of arsenious oxide, which condenses on the side of the wide tube in minute crystals of the charac teristic appearance before noted. The wide tube should first



ig 29—(b) Subli mate of Metallic Arsenic by the Re duction Process

The absence of severe symptoms in the Case on p 486, is no doubt attri butable to the sparing solubility of the poison

7 Prepared by adding ammonia to silver nitrate solution, in quantity just

sufficient to dissolve the precipitate at first thrown down Prepared from copper sulphate solution in a similar way Black flux

be warmed above the metallic ring, as arsenious oxide is apt to condense on a cold surface as an amorphous powder. This 'reduction process' may be used for the identification of other solid dry arsenical compounds, other thru white arsenic For 'details of Reinsch's and Marsh's tests see pp 513-15 For Fortsting for arsenic in bones, see p 516.

In consequence of the delicacy of the tests for arsenious acid that poison is rendily found, if present, in exhiumed bodies suspected to have died from arsenical poisoning, and also in

the cremated remains of such bodies

(are—Arsenic found in cremated body—In a case of suspected arsenical poisoning from Monghyr in 1919 arsenious acid was found in the cremated remains of the woman—Hermanii Adhikari in Bengal Chem Leannier's Report, 1919

### Sulphides of Arsenic.

Two of these are in common use in India, viz the yellow sulphide, orpinent, hing's yellow or Hurtal, Asis, and the red sulphide realgri, Sandaracha or Mansel, Asis, Both appear to be favourite medicines of the hakims and to be in common use as diplatories, for this last purpose a mixture of orpinent and lime or carbonate of lime appears to be often employed. The yellow sulphide is largely used in India as a pigment for children stoys, painting tent poles and otherwise.

Orpment is obtained in large quantities from the imness in Clattal on the Lydres of the Hauda kind. The inners were described in 1899 as togeted and bent clothed in the most filth; riggs with dead villow faces, silm if the colour of the orpment itself after being exposed to the air is it is. They are small of stature and give one the idea of horrible manel. But worse than thus—they are all pitted and scarred with the terr light marks of what I believe must be a sort of skin disease due to const. Vi cent. Let with the pregnent. The affection appears to take more violent floid on those employed in the orj ment industry the longer they are explicitly of the short of the same than the constraint of the constr

Both auditides, as met with in commerce, usually contain much area in said, and are more or less actively poisonous according to be quantity of areamons ovide present, as the sulphide is Machible in water and also HCl. In India the sulphides of areance are used for criminal purposes much less frequently than areanous oxide.

In Bengal, etc., during the three years ending 1879, 2926 enses of human poisoning by arsenious oxide were reported, as against 17 by the sulphides [all by orpiment]. In Bombay, during the ten years ending 1894, sulpidies of arsenion were detected in less than 6 percent of the total number of cases of arsenical poisoning brought to the notice of the Chemical Analyser to Government!

Human poisoning by the sulphides.—None of the seventeen cases mentioned above were homicidal, nearly all appear to have been cases of suicide. Chevers, however, gives details of two cases of attempted homicide by orpinient introduced into food; and Waddell's mentions three fatal cases of poisoning by orpinient, of which two were homicidal, in cases examined by his department in Bengal in one year (1884). In Bombuy a few cases of poisoning or attempted poisoning by the sulphides have occurred, of which some (see Cases below) were cases of homicide or attempted homicide; the poison, in a few cases realigar, in a few others orpinient, and in a few the mixed sulphides, having been given, or attempted to be given, in a set of the cases of homicide or attempted to be given, in a few others or attempted to be given.

Cases - Cases of possoning by the sulphides of arsenic (Bo Chem Analyser's Lepts ) -(a) In Bombay several persons were poisoned, all of whom, however recovered, by orpiment contained in food The poison was introduced into the food in turmeric powder, which, on examination, was found to contain over 90 grains of orpiment per ounce -(b) The wife of a man who was very ill with fever confessed to giving orpiment, apparently in some congi (rice-starch) The husband died three days afterwards, traces of areenic were found in his viscera. The post mortem appearances were much congestion and inflammation in patches of the gastric mucous, membrane, small intestines also inflamed, and in parts in a state approaching mortification, liver and spleen enlarged, and signs of commencing inflammation of both lungs -(c) In another case orpiment was found in some cooked rice. A man who had partaken of a portion of this rice suffered from symptoms of irritant poisoning but recovered, -(d) Several persons, all of whom recovered, were poisoned by bread made from flour in which, on analysis, or ment was found -(e) An apothecary, stationed in Sind, noticed some red powder at the bottom of a cup of tea he was drinking, this proved to be realgar. One of his servants, taxed with having attempted to poison his master, confessed to having put the powder in the tea at the instigation of a man, who told him that it was a charm which would lead to the early transfer of the apothecary -(f) A woman having confessed to having given to a child, who died from arsenced possoning, some sogar mixed with not poison, this rat poison proved to be a mixture of flour and realgar -- (a) The servant of a shopkeeper at Karachi brought to his shop as part of a meal intended for him an omelette, in which some red powder was visible, this turned out to be realgar -(h) In a case in which two persons died from poisoning by arsenic some flour and bread of which they had eaten a portion, was found to contain mixed orpiment and realgar -(1) In a case of attempting poisoning some sweetment, forwarded for examination, was found to contain both realgar and ornment

<sup>&</sup>lt;sup>1</sup> See Append; XIV Med Jur, p 128 <sup>2</sup> Beng Chem Fx Rept, 1884

Abortifacient use—Orpiment seems to be sometimes employed as an abortificient, or ingredient of abortifacient preparations

In one of the 17 cases above noted oppurent appears to has a brent taken with the object of procuring abortion. In several cases in Bonlay, oppurent was found in packets discovered in the possession of persons charged with procuring abortion, and in one or two cases in pawkers state I to have I een given with this object. In one of these la i mentioned calcium. In one of two cases it was mixel arsenious orde and oppurent, in the paste used for ariming obstitutions in another cases in which is not the paste used for ariming obstitutions. In another cases in which there is a state of the control obstitution of the paste of the case of t

Detection.—When pure, the sulphides are practically insoluble in water and hydrochloric acid. Heated per st, they yield a mixed sublimate of sulphuric and oxide. Their identification is best effected by the reduction process, converting the ring of metallic arsenic obtained into arsenious oxide, to which, after solution in boiling water, the liquid tests for arsenious oxide may be applied.

# Arsenites of Copper

Two of these are in common use as pigments namely, Scheele's green CuHAsO. (acid cupric arsenite), and Schueinfurth s or emerald green (aceto areente of copper), 3CuAs O4 + Cu(C2H2O2)2 Both are known in India under the name 'Hirwa.' Both, although insoluble in water, are readily dis solved by the acid fluids of the stomach and when absorbed give rise to the usual symptoms of greenical poisoning They are seldom used in India either by homicides or suicides, occasionally accidental cases occur In Bombay, two instances of alleged attempt at homicide by arsenite of copper (see Cases, p 507) have occurred, and several cases of suicide by arsenite of copper have been reported in Bombay and Calcutta Cases of poisoning by the arsenites of copper usually arise either from their being used in i norance to colour confectioners or toys or from their accidental absorption into the system from other articles coloured by them

A whole family were possened by halace (a kind of sweet met) thus coloured in Bombay, and Taylor records a fatal case earsing from cating blancmange, coloured with areenite copper Again in several instances, areenite of copper is used to colour small sugar plums known as hit-gul, which are sold at the

Maakar Sakrant festival, 1 and Dr W Center states that the confectioners of Labore use arsenite of copper to colour their wares 2 Taylor mentions several instances of children being poisoned by confectionery coloured with these compounds Cases of the second class are often cases of chronic or slow poisoning, arising from inhalation of particles of the poison, detached from wall papers coloured with arsenical green Chevers mentions one such case as having occurred in India, also another where the poisoning resulted from sleeping in a bedroom, the walls of which had been coloured with arsenite of copper, loosely put on with size 3 Children again are sometimes poisoned by sucking green arsenical paint off toys (see Case below)

Suicidal poisoning by arsenite of copper -A case of poisoning by Scheele's green was referred by the Coroner of Calcutta in May, 1910

Homicidal poisoning of attempted poisoning by the arsenites of copper (Bo Chem Analyser's North )—(a) A woman was found in the act of putting something into a pot of drinking water standing in the house of a Bhora (trader) She was seized, and a packet found in her hand, in which was a quantity of aceto arsenite of copper. In the struggle the pot got broken and the water spilt, but accto arsente of copper was found in some earth collected from the spot—(b) A woman charged a man, described as her ' kept husband, with an attempt to poison her, by giving her in heu of gulchand (a sweetmest containing Indian hemp and conserve of roses) a substance which, on examination, was found to consist chiefly of sugar and arsenite of copper -(c) A child, about ten months old was admitted into the J J Hospital, Bombay, suffering from symptoms of irritant poisoning the result of sucking the paint off a toy parrot painted bright green with arsenite of copper

Detection -Both arsenites of copper are soluble in solution of ammonia, with formation of a blue liquid, which on evaporation redeposits the compound Both also are soluble in hydrochloric acid, the solution the compound not have accessed in Jackson and the second of the second liquid tests for this metal (see copper), and (2) endence of the presence of arseme to Remsch a process (which see, p 513) The presence of arseme in these compounds also may be demonstrated by the reduction process as directed for the sulphides The presence of acetic acid in the aceto arsenite may be recognized by heating the compound with sulphuric acid when free acetic acid is liberated, or with sulphuric acid and alcohol, when acetic ether is evolved

### Other Poisonous Arsenical Compounds,

'Rough on Rats' has been used for suicide, see cases below Case - Suicide by 'Rough on Rate'-A young married Mohammedan

woman separated from her husband and living in Calcutta, committed

1 In January In one instance the til gul, from a vendor's stool, green red, and yellow sugar plums was coloured respectively with aceto arsente of coper, mercure sulphide, and chromate of lead 1 Ind Med Gaz, 1874, p 115.

solicide by cating 'Bough on Bate' Arsenie was detected in the success, and in the vachings of their stonach. The sample of Bough on Bate' of which the deceased had partalen was found to contain \$1.02 per cent of assenious acid. The post morters examination revealed the preserve in the uterus of a four weeks featur—L. A. Waddell, Beng Chem Ex. Rept. 1809.

Fly-powder —This is a block powder, consisting of, or containing inetallic arsenic, parily conterted into arsenious oxide. 'Fly-papers' (Arsenate, see below) were used as a source of arsenic in the May brick case (p. 485)

Arseniuretted hydrogen -This highly porconous gas is evolved when hydrogen is set free from materials, or in liquids. containing arsenic (see Marsh's Process, p 515) A few cases of poisoning by it, all accidental, have been reported. Alkalme Arsenites -These are more soluble in water than arsenious oxide Cases of poisoning have been recorded from Fowler's solution (Liquor Arsenicalis BP and LP), which is a weak solution of polassium arsenite, coloured with compound fincture of lavender, strength, IP, four grains of arsenious oxide to the ounce, or BP of 1885 4 375 grains to the ounce or 1 per cent Cases (see p 495) have also occurred from the use of arsenions oxide mixed with potassium carbonate solution (potassium arsenite) as sheep wash, and Taylor mentions a case in which 340 school children were poisoned by drinking ter made with water from a boiler into which mixed arsenite and arsenate of sodium had been put, in order to cleanse it from deposit 'Weed killer' (Arenate of Sodium) has caused several deaths by using the empty casks for culmary purposes or water storage (Lancet, 1891 900) Alkalme arsenates .-These rarely give rise to cases of poisoning Taylor 2 refers to three accidental cases and gives details of one attempt at homicide, in the latter, arsenate of potassium was given in wine. Paper sorked in solution of an alkaline argenate mixed with sugar is used for poisoning flies, under the name of Paper Moure or Fly paper Areanate of potassium is used for preserving skins, and has lately been imported into India for this purpose. Chevers ' mentions two cases (both in Panjab) of attempted cattle poisoning by pieces of grass moistened with solution of potassium arsenate. Arsenic in dyeing materials.-A large number of dyes of various colours, are obtained from resamline a red colouring matter prepared by the action of an oxidizing agent (usually arsenic acid) on antine Red antine dies have been found to contain aremic

This was the strength of the preparation of the D P of 1807.
\* Persons p 251
\* Med Jur p 133

Cacodylates of Arsenic. These have lately been introduced as antisyphilides under a variety of names. Atoxyl '666 Saliarson etc. Many cases of poisoning by thom are reported Death from Salvarsan and allied preparations has frequently resulted from —

(1) Extensive sloughing when administered subcutaneously or intramuscularly

(2) From pulmonary thrombus and embolism through faulty

technique in injecting muddy solutions intravenously

(3) From hyperpyrexia vomiting and purging In these cross the post mortem signs are generally injection and ecchyrinosis of the inviews of the stomach (probably due to the fact that much of the arsenic is excreted into the stomach) in injection and parenchy matous inflammation of the kidneys and in many cases sub endocardial hymorrhages

(4) A bæmorrhagic encaphalitis coming on later with symptoms of paralysis and coma characterized post mortem by

dotted hæmorrhages in the brain and its membranes

Double optic neuritis common in atoxyl poisoning is rare

with Salvarsan

The signs were identical in 19 horses dead through atoxyl intravenous injections for surra which Professor Powell examined post morten

Liquid reactions of ariente acid —Ariente acid differs from arientous acid in giving (1) a red brown precipitate with silver intrate and (2) in moderately strong solution a precipitate with a mixture of ammonium chlor de and magnes um sulphate solutions. An acidilated solution of ariente acid is precipitated by sulphate that may be more allowly than a similar solution of arientous acid.

# Detection of Arsenic in Viscera, etc

Arsenic is not a cumulative poison in the usual sense as though temporarily deposited in organs after absorption it is rapidly eliminated by the urine and other secretions hence the importance of preserving the urine for analysis. Sir T Stephenson found it in the urine for four days after a poisonous dose (Taylor II 490)

In the presence of organic mutter the ordinary tests for the recognition of arsenic become inapplicable. Eurther, the ready volatility of arsenic precludes incineration being employed for the destruction of organic matters mixed with it. Hence to separate arsenic from organic matter and bring it into a form in which it may be readily recognized special processes are required. For the detection of arsenic in bones see p 51°C Pefore describing these certain points bearing on the inferences to be drawn from the analytical results must be considered

1 Disappearance of arsenic from the body (a) after death -Arsenic like other inorganic poisons cannot disappear by putrifaction. Hence it may be detected in human remains after any period of interment. Its antiseptic power and the sparing solubility of its most commonly used compounds tend specially to favour this On the other hand arsenic being volatile at the temperature of combustion may disar pear when a body is burnt, though it has been detected in partly burnt bodies (see Case p 511) (b) Disappearance during life -During life vomiting and purging tend to free first the stomach and subsequently the intestines from the poison In exceptional cases complete disappearance from the contents of the stomach

may take place very rapidly

Taylor mentions a case where this occurred within 24 hours, and I once met with a case in which arsenic could not be detected in the contents of the stomach of a woman who died from arsenical poisoning in six hours 2 On the other hand two cases are recorded one of death in six and the other of death in seven days in both of which arsenic was found after death in the contents of the intestines 3 During life also absorption of the poison takes place very rapilly. Taylor found it in comparatively large quantity in the life of a case of death in three hours Again during life absorbed arsenic tends to undergo elimination from the body by the kidneys and other emunctories Complete elimination may undoubtedly tal c place in 15 days and may there is good reason to believe take place even in a shorter time than this (see Cases (a) and (b) below) On the whole therefore (1) Entire absence of arsenic from the body is quite consistent with the supposition of death (after some days) from areencal poisoning, it however strongly indicates survival for some days and (2) In case of a death from arsenical poisoning absence of arsenic from the alimentary canal is a moderately strong indication that the individual lived some time after swallowing the poison the indication being stronger if arsenic is found to be absent from the contents of the intestines as well as from the contents of the stomach

Cases - Death from arsenical possoning - Complete elimination of arsenic from the body—(a) (Taylor Loisons 1 335) A woman was charged with poisoning ler husband by arsenic The husband suffered from the usual symptoms of arsenical poisoning and died from exhau-tion on the fifteenth day No arsenic could be found in the viscers of the deceased Ir Herapath of Bristol who made the analysis, stated that neither in h reading nor experience had he known arsenic to have

<sup>&</sup>lt;sup>2</sup> Poisons p 335 <sup>4</sup>

<sup>8</sup> Bomba f Chem i naisyser s Pept 1849-80 The poison was given in food arsenic was detected in the liver

<sup>9</sup> Taylor Logions p 835. 

<sup>1</sup> Ibid p 331

been detected so long as 15 days after its administration '—(b) (Bo Chem', Analyser's Repl. 1874-76). "In a case from Alimediagar, a man lived three days after a dose of about 75 grains of arsenic. He is said to have suffered during the whole time from purging and vomiting.' Not a trace of the poison could be found in either the stomach or liver. Dr. Welling of Gray, who made the analysis, remarks in reference to this case. "It is quite possible that arsenic may have existed in the more distant tissues of the body, for the examination of which no opportunity was given' Arsenious oxide was detected in some bread, a portion of which had been eaten by the deceased

Case -Detection in cremated remains -Two persons suffered from choleraic symptoms, and one of them died and was cremated, but when the other one also died in a few days, suspicion was aroused viscera of the latter and all the suspected articles connected with the case were sent for chemical examination, including ashes from the scene of Arsenic was found in the visceral matters and excreta, and even in earth scraped from the spot where the washings of a tumbler had been spilt. Interest attaches to the fact that appreciable quantities of arsenic were easily detected in the ashes and bones from the scene of cremation, contrary to expectation, for a volatile poison like arsenic would be dissipated by fire and lost beyond the possibility of detection in any thing reduced to ashes, but the conditions under which eremation is usually carried out here evidently do not favour complete combustion and sublimation of the volatilized arsenic on the cooler parts of the funeral pyre is liable to take place and its loss thus prevented. This is borne out by another such case which was examined during the year, in which arsenic was easily detected in ashes and charred bones, etc. sent from the cremation ground The point is one which is worth noting by magisterial and police officers who have to investigate cases of suspected poisoning in which the corpse has been cremated -Mad Chem Lx Rept , 1902

Case — Detected in dead body after as: months — The Civil Surgeon of Desore sent a fleshy mass supposed to contain the remains of the addominal viscers of a Mohammedan adult female who was reported to have died of cholera. The Magistrato on certain information suspected foul play in the case and ordered the disinterment of the body after six months. The soft parts of the body were found dry and shrived and absent at places. The internal organs were undistinguishable. The history pointed to bloody stools passed before death. The fleshy mass on chemical examination was found to contain arisenic — C. L. Bose, Beng Chem. Ex. Rept., 1912.

- 2. Conversion in the body of arsenious oxide into yellow sulphide of arsenic—It has already been pointed out that this may accour, the reverse change cannot, however, take place! The discovery, therefore, of arsenious oxide in the body shows that the poison administered contained arsenious oxide. On the other hand, the discovery of yellow sulphide of arsenic in the body does not prove that the poison was administered in the form of yellow sulphide.
- 3 Presence of arsenic in earth,—Arsenic is sometimes found in minute quantity in earth, but has hitherto only been

found in earth in a form insoluble in water. It has been alleged however that arsenial earth may under the action of the air yield a soluble arsenial compound. Further it has been found that when arsenic in solution is introduced into the alimentary canal of a dead body post mortem imbilition takes place and arsenic passing through the walls of the alimentary canal becomes imbibed by tissues external to but in contact therewith.

In the case therefore of an exhumed body in the viscera of which arsenic has been detected it may be alleged that the arsenic found therein was derived from the surrounding earth. Either of two cases may arise. The parietes of the body may be found (1) intact or (2) not intact and the viscera more or less mixed with earth. In case (1) the discovery of any notable quantity of arsenic in the body completely negatives the theory of earth derivation The presence of traces even can hardly be accounted for in this way In case (2) the earth derivation theory is in the highest degree imi rol able if a notable quantity of soluble arsenic is detected. Whenever however, case (2) arises a portion of the surrounding earth should always be submitted to analysis and even in case (1) it is advisable to preserve a portion of the surrounding earth so that it may be examined for arsenic should traces only thereof be found in the body In India vomited matters are frequently found mixed with earth here again it is important to ascertain whether or not arsenic present in such matters is present in a form soluble in water Should soluble arsenic be present and especially if it be present in notable quantity earth derivation is improbable-Larth and gravel are often found in the stomachs of cattle Hence the presence of a minute quantity of insoluble arsenic in the bodies of such animals may possibly be accounted for on the theory of earth derivation

4 The wrappings or envelopes enaployed to euclose sus pected poison or poisone! food sometimes contain arisente for example yellow packing waxed cloth occusionally contains traces of arisenc—and this possibility should be evoluded by a control test.

Quantity of arsenic found —The quantity of arsenic found in the viscera of an individual may to a certain extent affect (a) the presumption as to suicide or homicide or (b) the pre sumption as to the cause of death as has already leen considered. Bearing specially on the possibility of a minute quantity of arsenic being discovered in the viscera in a case of death from causes other thru arsenical poisoning are 11 of following points —(1) the existence of the habit of arsenic

eating and the frequent use by hakims of arsenie in the treatment of disease, (2) the possibility of earth derivation just discussed, and (3) the fact that arsenie is not a natural constituent of the body, although the contrary was at one time asserted it must not be lost sight of also that arsenie may be present in small quantity, as an impurity, in drugs administered for medicinal or other purposes and in reagents. Antimony and bismuth 4 compounds are liable to contain traces of arsenie, so also is sulphuric acid and it has already been mentioned that realgar has been found in opium

# Processes for separating Arsenic from Organic Mixtures.

The principal processes employed for the separation of arsenic from organic mixtures are (1) deposition as metallic arsenic or copper, or Reinsch's process, (2) separation as asseniuretted hydrogen, or Marsh's process, (3) separation by distillation as chloride of arsenic, and (4) separation by precipitation as sulphide of arsenic. Many of the reagents used in the above process eg sulphure acid, hydrochloric acid, metallic zinc and metallic copper, are specially liable to contain arsenic. All should therefore, be ascertained to be arsenic-free before use. As regards metallic copper, however, see Reinsch's process.

Reinsch's process—Thus consists in boiling the suspected liquid acidulated with about one fourth of its volume of hydrochloric acid (or solid matters cut into small pieces and mixed with hydrochloric acid diluted with about two volumes of water), with a succession of pieces of clean, bright, metallic

copper foil or gauze

"The strip of copper used in the test should first be cleaned in the following way Prepare a mixture containing water 100, sulphuric acid 100, intro acid 50 and hydro chloric acid 2 parts. A few drops of this acid mixture are allowed to fall on the strip of copper. The acid is immediately washed off in running water and the copper at once used for the test (Haulin). If arsenic is present a steel grey or black stun—an alloy of arsenic and copper—forms on the

2 L

<sup>&</sup>lt;sup>1</sup> Dr. Ruchardson in the case of R. v. Smethurit stated that in the bismuth usually administered in medicine (sub intract) be had found nearly half a grain of arisinic per ounce and that in one case where for dyspens five grains of bismuth had been given three times a day for six days be had found about affinished that the found to be subject to the state of the

surface of the foil or gauze. The statued pieces of copper are then washed I dried, and heated in a test tube, when the stain. if arsenical, disappears, and a sublimate of arsenious oxide is obtained, which, under the microscope is found to consist of minute crystals of the characteristic appearance before noted. Unless such crystals are obtained, the presence of arsenic has not been demonstrated, because the staining of the copper may be due to (1) the action of organic matter only or the formation of sulphide of copper, or (2) the deposition on the copper of metals other than arsenic, og mercury, antimony silver, bis muth, etc. Under the circumstances of the process, however, of the metals other than arsenic which deposit on copper, two only yield sublimites viz mercury, which yields a sublimate of minute globules of metallic mercury, and antimony, which yields a non crystalline sublimate. Heinsch's process is the most generally applicable of all It cannot, however, be used in cases where the hould contains matters which dissolve the copper, eg mitrates, chlorates or ferric chloride. It is only also in such cases that the presence of arsenic in metallic copper can lead to error 2 Hence if the copper dissolves, or the deposit forms only very slowly thereon, one of the other

processes should be resorted to When carrying out Reinsch's test on vomit mixed with ashes, the addition of a further quantity of acid may be required, as part of the acid will have been neutralized by the alkali of the ashes. Occasionally in cases in which vomit has been mixed with earth it will be found that the strip of copper during the boiling shows signs of corrosion and may ultimately dissolve
This effect is probably due to the presence of intrates
Should this occur a fresh sample of the earth vomit mixture should be placed in a basin with dilute hydrochloric acid and raised to the boiling point. Some powdered ferrous sulplude is then added After boiling for a short time the mixture is allowed to cool and kept till the next day It is then boiled for some time (to drive off H.S) and the strip of copper is added. The arsenic if present

<sup>1</sup> The copper should be washed successively with water, alcohol and other In some cases this is insufficient and on heating the copper charring occurs and liquid sublimes over obscuring the arsenic crystals. Should this occur ann, apant summes ever concurring the arment expects. Should this occur another piece of the copyre having the arment deposit must be taken and another piece of the copyre having the arment deposit must be taken and direct with blottling raper on heating it in a tube a perfectly clean arment assultmate will be obtained (Hankin).

In the same way as the metallic ring in the reduction process (see § 42).

Unless such surfaces are reposent the copyer does not density during the contract of th

the process. If the copper remains undissolved and becomes rapidly coated an arsenical deposit formed on the copper cannot be due to the presence of arsenic in the copper employed

will then be found to be deposited in the normal way (Hankin) A Windsor's clip is very useful in carrying out the Reinsch test. This consists of a glass rod of which the end has, while heated, been twice bent round parillel to itself. The rod thus prepared is used as a clip to hold the piece of copper (Hankin)

Marsh's process -This consists in introducing a liquid suspected to contain arsenic into a vessel from which hydrogen gas is being evolved. If arsenic be present, the nascent hydrogen attacks it, forming arseniuretted hydrogen arsenical nature of the gas evolved may be proved (1) By passing it through a narrow hard glass tube heated to redness for a portion of its length, when a deposit of metallic arsenic forms in the cool part of the tube beyond the heated portion (2) By igniting the gas and holding a piece of cold white porcelain in the flame when a deposit of metallic arsenic forms thereon (see Fig 30) (3) By passing the gas through solution of silver nitrate, when a black deposit of metallic silver is thrown down and the arsenic is converted into arsenic acid, which remains in solution The arsenical nature of these pro ducts of the process is proved as follows -(1) The portion of the narrow tube containing the deposit or ring of metallic arsenic is heated in a wide tube like the metallic ring in the reduction process (see p 503) It volatilizes readily yielding a

similar crystalline sublimate (2) The spots on porcelain, where thin are seen to be hair brown in colour, and (a) are soluble in chloride of lime solution (b) are insoluble in stannous chloride solution and (c) dissolved in aqua regia, the solution when evaporated to dryness, vielding a residue of arsenic acid, which gives a brick red precipitate with silver nitrate solution (3) The silver nitrate solution is treated with excess of hydrochloric acid, filtered, and the filtrate evaporated to dryness, silver nitrate solution added to the residue gives a brick-red precipitate The apparatus used may be an ordinary gas-bottle such



Fig 80 - Deposit in Marsh s Test A.-Metallic Arsenic B-

A.—Metallic Arsenic B.— Mixed Metallic Arsenic and Arsenicus Oxide (anhydride) C.—Arsenicus Oxide (anhy dride).

as is employed for preparing hydrogen gas, fitted with a tube filled with fused calcium chloride (for the purposes of drying the gas coviced) to which is attached a long narrow hard glass tube, ending either in a jet or a downward bend. The materials used may be zune and dilute sulphure acid, or zinc and hydrochloric acid.

be allowed to escape before heat is applied to the narrow tube (avoidance of explosion). Before the suspected liquid is introduced, the narrow tube must be heated to redness for about fifteen ninutes. If no deposit forms, the materials are aresine-free. In this way the purity of the hydroclionic acid used in Reinsch's and other processes may be ascertained. Bloxam's modification of Marsh's process consists in evolving the hydrogen gas required by electroly the decomposition of water acidalated with sulphure acid. In this way the use of zine (which frequently contains arsenic) is avoided. In another modification, Fletimann's, applicable to arsence but not to antimony, the hydrogen is evolved by heating zine with potassic hydrate solution. Marsh's process is not applicable to the sulphides of arsenic, or to solutions containing arsenic as arsenic acid, or as an arcenta (see, however, below)

The chloride distillation process.—The substance under examination (cut into small pieces if a solid) is first thoroughly died on a ware both The dry residue is then distilled to drypess with the strongest obtainable hydrochloric acid and the residue in the retort distilled again to dryness with a little more of the same acid. Under these bonditions, arsent, if present distills over as chloride of arsenic, and may be recognized in the distillate, by subjecting this to Remels or Marsh is towed.

To Test for Areme in Bones —The bones are broken up into small pieces and placed in a flask. Sufficient concentrated subjusture and is all selt to cover them. The flask is beated till signs of charming and solution of the bones are manifest. The heating should be done over a sand bath. A deep water bath containing sand is preferable for the purpose Sulphure acid must not be heated over a water bath containing water as this might lead to a dangerous accident if the flask were to crack white heating the flask is set andse till the next day Crystals of fl jost color of methyl acobic. The task is sheted and the contents diffilled A current of hydrechloric send gas is bubbled through the contents of the flask white he distribution is going on. The areancy setting the flask while the distribution is going on. The areancy settin the flask while the distribution is going on. The areancy settin the flask while the distribution is going on. The areancy settin too. It is amount may be estimated by means of Varsh a test (see Collins, the Analout 70 (AUXVII.) p. 292 June, 1912).

Precipitation as subhade of areaux — Mixtures containing little organic matter may be based with duthe hydrochloria cach filtered and the filtered precipitated by washed sulphuretted hydrogen. If much organic matter be present this must be first destroyed by boiling the substance under examination (cut into small pieces if a sould with diline hydrochloria cach and adding to the boiling liquid from time to time, a small quantity of crystallized potassic chlorate. The organic matter having been destrowed, the liquid is filtered, sulphurous acid added to it 1 and washed sulphuretted hydrogen passed through it. The precipitated sulphuse seep rated by filterion, washed, dissolved in ammons, the solution, as the organic matter having been destroyed by filterion, washed, dissolved in ammons, the solution.

<sup>&</sup>lt;sup>1</sup> To reduce the arsente acid Marsh's process may be applied to the detection of arsenic acid and the arsenates, if these be first treated with sulphurous acid.

filtered, and the filtrate evaporated to dryness. The residue of impure sulphild of arsenie may then be subjected at once to the reduction process, or (for quantitative determination of the arsenie present) treated as follows—Boil with strong interaction, and the determination of the arsenie present) treated as follows—Boil with strong interaction, and the determination of the dryness, dissolve in a little water, filter, and atto the intrate a mixture of solutions of magnesium sulphate, ammonium chloride and ammonia. After twenty four hours filter, wash the preceptiate with ammonia water, dry and weight it consists of ammonium magnesium arsenate, and contains 39 47 per cent of metallic arsenic

### Antimony.

Antimonial poisoning is extremely rare in India It usually arises from the potassio-tartrate or tartar emetic A few cases also are recorded of poisoning by the chloride (butter of autimony)

Tartar emetic.—This, also called potassio-tartrate of antimony and tartarized antimony, produces effects on the system very similar to those produced by arsenious order. Unlike the latter, however, it has a strong metallic taste. Tartar emetic has a very marked depressant action on the heart and on the nervous system generally. Hence, in poisoning by it prominent symptoms are extreme faintness, collapse, and muscular weakness. Loss of voice has been noticed, and cholerate symptoms, and convulsions often precede death. In exceptional cases (as an arsenical poisoning), vomiting is slight or absent, necessitating the administration of emetics. Tartar emetic applied to the skin produces a pustular eruption thereon, and may become absorbed, giving rise to constitutional symptoms. A pustular eruption on the skin has also been noticed in cases of poisoning by internal administration of the drug

Acute poisoning by tartar emetic is seldom homicidal, it is requestly accidental from the poison being mistaken for some harmless powder, e.g. Epsom salts, or carbonate of soda It may also be remarked that, although tartar emetic is popularly well known to be a powerful emetic, it is not equally well known to be a powerful poison. It is possible that this may explain the mysterious Bravo case (see below)

Gases—Antimonal poisoning—Homacdal—(c) The Brave case (July, 1876). In this case Mr Brave a young married man of good position, deal undoubtedly from poisoning by tartar emetic. Deceased, on the ovening he was attacked with symptoms of poisoning stated—so one of the witnesses at the inquest deposed—that, owing to jealousy of his write he had taken poison. Shortly after this he became very ill, and medical assistance was sent for Sir W Gull, one of the physiquans scalled in, stated that he told the patient that the symptoms were due to poisoning, and asked him how he came by it. He aiswered, "It took it mysself" is

<sup>1</sup> Christison, Poisons, p 432 (2nd Ed )

Asked what he had taken, he replied, " Laudanum " Told that he must have taken more than laudanum, he said, ' Before God, I only took laudanum. There was no evidence to show how deceased came by the turtar emety, from the effects of which he died and the coroners surv returned a verdict of wilful murder against some person or persons unknown—(b) Reg v Smethurst (Browne and Stewart's Trials, p 448) In July 1859 Thomas Smethurst, a surgeon, was tried at the Central Cruminal Court for the murder by poison of Isabella Bankes, a lady with whom he had contracted a bigamous marriage Deceased, just before her death, made a will, leaving all her property to the prisoner. The medical witnesses for the prosecution deposed that, in their opinion, the cause of death was slow possoning by some arritant, and on analysis traces of antimony were found in the viscera of deceased. For the defence, it was urged that several of the symptoms of slow poisoning by arsenic or antimony were absent. eq there was no conjunctivities no skin disease. and no exconstrons at the orifices That the symptoms, etc. might have been due to acute dysentery. That the vomiting and diarrhea from which deceased suffered might have resulted from her being in an early state of pregnancy That the traces of antimony found in the viscers fand a minute quantity of arsenic found in an evacuation passed by deceased) might have been due to the presence of arsenic in the bismuth, and of antimony in the grey powders, administered as medicines. The prisoner was convicted. Subsequently memorials, backed by the opinions of eminent medical men, were presented to Government in the prisoner's favour and he was pardoned .- (c) Case of Dr Pretchard (tb , p 397) In July, 1865, Dr Pritchard, of Glasgow was tried for the murder of his wife and mother in law, the first by slow poisoning with antimony, and the second by porsoning with antimony and acouste. Antimony was found in the viscora of both. The prisoner was convicted, and subsequently confessed his guilt -td) I v Klosowski, C. in Times, March 20, 1903, was an unportant case

Chronic poisoning.—Some remarkable trails for murder, by the administration of repeated small doses of latter emetic, have taken place in England (see Rig v Smrtharst, and Dr Pritchrul's trail, Causes 1b) and (c), supra) In some cises of chinous antimonial poisoning, the failure of ordinry medical treatment to control the prominent symptoms, viz nausea, vomiting, and durthica, with great depression and missualar weakness, has been the first thing to excite suspicion as to the true nature of the case.

Preparations containing tartar emetic.—Vinum antimonale B P and I P contains 2 grains of tartar emetic per ounce. Tartar emetic is also contained in small quantity in several quack, pills, q Dr Johnson's, Mitchell's, and Dixon's pills, and forms one fifth by weight of the Unquentum autimonit tartarati B P and I P. Fatal period —Shortest recorded, seven hours (in a female, et 21)<sup>2</sup> Longe-t, one yer's Usual,

<sup>1</sup> About one sixteenth to one twenty fifth of a grain in each pill (Blyth, Poisons, p. 547)
2 Wormley, Poisons, p. 218
3 Guy's For Med , p. 426

ten hours to four days Fatal dose—Smallest (in a child) three quarters of a grain Largest non fatal half an onnee Taylor considers that under circumstances frowurable to the action of the poison ten to twenty grains taken at once might prove fatal to an adult, but that if taken in divided doses a smaller quantity might suffice <sup>1</sup> Post mortem signs—Similar generally to those of arsenical poisoning Aphthous inflammation of the mouth throat and gullet and aphthous ulceration of the small intestines have been observed Triatment—The usual treatment for irritint-poisoning with the administration as an antifole of an infusion containing tanning of solution of tannic acid, decoction of oak bark or of cincliona bark or strong tea Stimulants may be required to counteract depression

### Other Antimonial Compounds

Trichloride or Butter of Antimony SbCl3 - \ strong solution of this is used for browning gun barrels also sometimes in surgery as a caustic and in pharmacy as a source of oxide of antimony. It is highly corrosive giving risc when swallowed to symptoms of corrosive poison ing plus constitutional effects similar to those caused by tartar emetic A few fatal cases of poisoning by the chloride of antimony are recorded one of these parcetism succeeded the usual irritant symptoms The post mortem appearances are those of corrosive poisoning. Antimony trioxide Sh.O. although insolul le in water is soluble in the fluids of the stomach It is used in medicine in the form of Pulvis antimonial s—an imitat on of the old James s powder—a mixture of one part of oxide of antimony to two of phosphate of lime Its action on the system is similar to that of tartar emetic, but milder in degree Over doses of it have given rise to dangerous symptoms Antimony trisulphide, Sb,S, -This is met with in two forms (1) as a black crystalline mass or powder-native sulphide of antimony black ant mony or a irma 2 and (2) as an orange coloured powder—precipitated sulphide of antimony. Although pure sulphide of antimony is probably mert the following points of medico legal interest attach to it (1) Commercial black sulphide of antimony frequently contains arsenic hence—if not first thoroughly purified tartar emetic prepared from it is I able to contain arsenic (2) The orange sulphide of antimony plus a variable proport on of antimony trioxide forms the antimonium sulphuratum of the BP an LIP and this forms about one fifth by weight of Plummer's pills (Pilula hydrargyri sub chloridi composita BP and IP13

Detection of animony—Animony after absorption is eliminated mainly by the time and may be detected during life in this fluid. It is probably eliminated from the body at least as rapidly as arsenic. Like arsenic also antimony does not disappear by decomposition and has been detected in the body after long pended of interment.

<sup>1</sup> Poisons p 464

<sup>\*</sup> Used in Ind a as a collyrium Women according to Balfour (Cyclopædia

<sup>111 219)</sup> always use kohl or lamp-black instead of surma The presence of ant mony as an occasional impurity in grey powder and submitrate of bismuth has already been noticed

Detection of antimony in organic mixtures -To Reinsch's process (see p 513) antimony, like arsenic, yields a deposit on copper, which, however, sublimes only at a high temperature, yielding an amorphous sublimate of Sh.O. For Reinsch's process in the case of antimony, the galvanic deposition process may be substituted. This consists in placing in a concentrated hydrochloric acid solution of the matters under exami nation, a slip of platinum foil, with a piece of pure zine in metallic contact therewith Metallic antimony is deposited on the platinum. The stained platinum is washed, boiled with nitric acid the acid solution evaporated to dryness and the residue dissolved in dilute HCl, and tested for antimony by hydrogen sulphide Deposits of antimony obtained by Marsh's process may be similarly treated 10 Marsh's process antimony yields deposits distinguishable from arsenical deposits (p. 515) as follows (1) The metallic ring in the tube is deposited closer to the herted portion, is sublimable only with difficulty and yields no sublimate of octahedral crystals (2) The spots on porcelsin are smoky black (not brown), insoluble in chloride of lime solution, but slowly soluble in stannous chloride solution (3) In the vessel containing the silver nitrate solution, the antimony falls (as antimonide of silver) with the deposit, and may be recovered by boiling the deposit for some time with tartaric acid Precipitation as sulphide - The organic matter may be destroyed in the same way as when this process is used for separation of arsenic. The precipitated sulphide may then be collected and dissolved by boiling it with strong hydrochloric acid, and the amount of antimony present estimated volumetrically by a standard solution of rodine, the antimony solution being first treated with sodium tartrate and carbonate, to weak alkaline reaction.1

### Mercury.

One of the most poisonous salts of mercury—the perchloride—is sold in every bazaar and is kept in the shops alongside spices, so that accidental poisoning is not uncommon in India.

Mercurial poisoning may be acute or chronic.—If acute, the symptoms may be either those of correste or those of non-corroste irritant posoning If climone, either salivation or mercurial tremors, or both, may be pre-ent; and in two cases of chronic poisoning by an organic mercurial compound (mercuric method) the brain was specially affected

Acute mercurial poisoning is rare in India Accidental cases are, however, occasionally met with, and very rarely homedial cases \* Symptoms —Acute mercurial posoning most commonly arises from swallowing corrosive sublimate, in which case, and also when the nitrates are swallowed, the symptoms present are those of corrosive posonomy.

1 Under the conditions stated Sh O, oxidizes into Sh<sub>2</sub>O<sub>2</sub>. The end reaction is the permanent appearance of free iodize in the inquid under test. I none such case the deceased a prostitute, duel from the effects of an irritant poison administered to her in sweatment by a man, afterwards trade.

and convicted of her murder. It was alleged that the posson used was restaring fees calomed) but the evidence on this point was very unsatisfactory (Obesers, M. J. p. 260). See also Case above

In acute cases other than these, the symptoms are those of non corrosive irritant poisoning, and vary in severity according to the activity of the compound swallowed Mercuric compounds are more active than mercurous compounds Soluble mercurial salts have a strong metallic taste. In corrosive crisc (1) intense burning pain in the mouth and throat comes on immediately, and (2) the lining membrane of the mouth and throat becomes white and shrivelled. These characters are absent in non corrosive cases. In both corrosive and non-corrosive cases the usual symptoms of irritant poisoning are present, and more or less complete suppression of urine is a common symptom. In some cases come has been observed If the case is prolonged, salivation, as in chronic poisoning, may appear, but this is not a common symptom in acute cases.

Case --- Acute Mercurial poisoning -- A convict in Port Blair was brought to the hospital on the evening of the 3rd September 1896 in a very low condition suffering from great pain in the throat and abdomen, and passing bloody stools and vomiting bloody matter. He said he had been bitten by a centipede in the leg and as he was in great pain some one gave him a draught to take saying that it would relieve him. He swallowed the draught and immediately he felt a burning in his mouth and gullet Directly afterwards the whole throat became painful and he could hardly swallow and he became restless began to vomit food mixed with blood and passed bloody stools with great pain He was in this condition when brought into the hospital In the hospital he had all the symptoms of irritant josoning Besides bloody stools and vomit he had suppression of urine followed by bloody urine in very small quantities The whole of the fauces were inflamed Soon the mouth and gums became ulcerated followed by loss of many teeth He became very low day by day as he could not take nonrishment well He constantly complained of pain and burning sensation in his abdomon and was always very thirsty. There was however no fever, until he got diffused cellulitis of the left side of the neck face and forehead and he died on the 12th October 1896 His viscera stools and the vomit which he had ejected on admission into the hospital were forwarded for exami Traces of mercury only were detected in the portions of viscera sent for analysis But both mercury and arsenic were detected in his vomit and stools It appears from this case that mercury is not so easily It appears from this case that mercury is not so easily eliminated from the system as arsenic. For although the man was in the hospital for nearly a month and a half traces of mercury were still detected in his viscera but no arsenic could be found in them. In this case as the symptoms of mercurial poisoning were so marked and as the quantity of arsenic found in the stools and vomit was so very small it may be presumed that arsenic was present in only small quantity as an impurity in the inercurial preparation which had been administered to the deceased -L A Waddell Beng Clem Ex Rept 1897

Post mortem signs.—These according to the case, may be those of corrosive or those of non corrosive irritant poisoning thereforation of the stomach is rare. The gastric mucous mem brane may be found covered with a greyish deposit of metallic

mercury or there may be a black deposit of the sulphide The intestines and urinary organs are generally much congested. In acute poisoning from external application of mercurial compounds post vortem appearances of irritation of the alimentary canal are present

Treatment —The usual treatment for corrosive or irritant poisoning with the administration as an antidote of albumen (e.g. white of egg) or other albuminous fluids  $x_i \in [t_i, t_i]$ 

Chrome mercurial poisoning is hable to arise in persons whose occupation exposes them habitually to the vajours of metable mercury or its compounds or to constant contact with microurial compounds. It may also arise from often repeated small doses of any mercurial preparation and hence may result from the abuse of such preparations in the treatment of disease Cases of this last description used formerly to be of frequent occurrence in India Symptoms—These may be debuilty naises and collowed by salivation. In other cases microurial fremors are the first symptoms to appear.

Salivation.-This commences with a coppery taste in the mouth The gums swell an I become tender and spongy There is profuse ptyalism fector of the breath and febrile disturbance A blue line may be present on the gums In extreme cases the tongue and cheeks swell ulceration appears in the month the jaws become necrosed and the teeth drop out Mercury is present in the saliva Salivation may (1) last for almost any period in one exceptional case it is said to have lasted six years (2) Intermit and recur after an interval of three months or more In exceptional cases also an interval of three months or more has been observed between the discontinuance of mercurial treatment and the first appearance of salivation (3) Appear in acute cases but rarely appears in these under twenty four hours although one case is reported where it appeared in three hours (4) Arise from very small doses -Idiosyncrasy in some cases renders an individual specially sunsitive to the action of mercury a case for example is recorded where salivation was caused by two gruns of colomel. In other cases, idiosyncrasy appears to have the opposite effect. Children it may be noted bear mercury better than adults (5) Art e from causes otl er than administration of mercury -Tius it has resulted from the administration of compounds of arsenic autimony copper lea! bismuth and gold, also from administration of iodine sulphurie acid hydrocyanic acid digi talis cantharides colchicum croton oil opium carbolic acid

and nitro-benzene, and may occur idiopathically. In non , mercurial salivation, mercury is, of course, absent from the Cancrum oris, a disease hable to affect children. especially those that are cacheotic or badly fed, has been mistaken for mercurial salivation. Taylor 1 mentions a case in which a child, having died from cancrum oris, a charge of malpraxis was brought against the medical attendant. It was however, proved that no mercury had been administered Mercurial tremors, or shaking palsy —This as a rule comes on gradually, affecting first the muscles of the arms, and subsequently those of other parts of the body The affection begins with unsteadiness and quivering, increasing to tremors, which ultimately become so violent as to resemble convulsions All voluntary movements requiring the aid of the affected muscles can only be performed by violent starts. In advanced cases, walking, articulation, and mastication all become affected Finally there is loss of memory, sleeplessness, delirium, and death. The skin is dry, and has a brown tint. Salivation may or may not be present

### Mercurial Preparations and Compounds.

(a) Corrosive sublimate, Mercuric chloride HgCl<sub>2</sub>— Talachikna sumbul Darchikna (Hind) This occurs in heavy-crystalline masses, or as white crystalline powder. In the crude form as obtained in the bazaars, it is an impure mixture with subchloride.

Heated it melts and sublimes in prismatic crystals. It is freely soluble in alcohol and ether and is soluble in sixteen parts of cold or three of boiling water and more soluble in solutions of alkaline chlorides than in pure water.

The ordinary medical dose is one sixteenth to one eighth of a grain, and three to five grains may be regarded as a minimum fital dose. A case of recovery after swallowing an ounce is on record. The usual fatal period is one to five days, but in one case death occurred in half an hour. Corrosive sublimate is readily absorbed through the unbroken skin, and acute poisoning, non-corrosive in character, may arise from its absorption. It is contained, to the extent of half a grain per ounce, in the Liquor hydrargyri perchlorid: B P and I P

Case — Corrosive sublimate — Suicide — In a case of suicide by mer curial poisoning nearly eight grains of corrosive sublimate were found in the viscent and vointed natters. The unfortunate individual suffects such intolerable agones from the poison that he rushed into the hards.

# 521 7 METALLIC IRRITANT POISONS

yard at Junped into a well from which he was rescued and taken to inspital. He was a photographer by profession and the chemical exammation was extended to every substance found in his dark room besides the examination of vinces arrived so I food and drink before supprison which rested upon innocent persons was removed—Mat I of an Ex Phyl 1868

- Case —Corrosre sublimate in pudenda—Homicide—Death—In 1808 in Madins a man surreplituously thrust a piece of corrosive sublimate into the pudenda of his write to punish her Intense local inflammation resitled followed by ulceration and constit it ord symptoms from which the woman ded 12 days after Accused got 10 years rigoro is imprisonment—Ust I Un L. R. Rept. 1809.
- (b) Nitrates of mercury, viz normal mercurous Hg2NO<sub>3</sub> and normal mercuro Hg2NO<sub>3</sub>. These salts are freely soluble in water containing intrice and but pure water is liable to decompose them with formation of sparingly soluble base nitrates. Heated they decompose grung off red funes of nitric exide and leave a residue of mercuric exide. Swallowed they produce symptoms similar to those caused by swallowing corrosive sublimate. A fatal case from external application of nitrate of mercury in a liniment is recorded also a case of throne posisoning from its use as a local application to the neck of the uterus, and another case where a workman whose occupation for four years had been packing skins bruched over with solution of nitrate of mercury died of chronic mercurial poisoning others however similarly employed in the same factory were numificated.
- (c) Other compounds—(1) Mercuric cyanide Hg(CN)<sub>r</sub>— This is a white soluble salt which when heated gives off an inflammable gas (cyanogen) and yields a sublimate of metallic Although non corrosive it is little less active than corrosive sublimate, ten grains has caused death. A case of acute poisoning (non fatal) from swillowing the sulpho cyanide Hg(SCN)2 is recorded. This more correctly mercuric thio cyanate is sold in little cones as a toy under the name of I haraoh's scrpent so called from the scrpentine form of the copious ash yielded by them when burned Each cone weighs \alogt 3 or 4 grains (2) Subsulphate, Turpeth mineral HgSO4(NgO)3—This is a yellow powder which although sparingly soluble in water (1 in 2000 in cold and 1 in 600 of luling) has a strong metallic taste. Taylor mentions two fatal cases in which the quantities swallowed were respectively forty and sixty grains (3) White precipi tate - Ammoniated mercury - Mercurammonium chloride NH2HgCl -This is prepared by adding solution of ammonia to solution of corresive sublimate It is a white powder which

when boiled with water becomes yellow It is soluble in nitric acid but insoluble in water, alcohol and ether According to Taylor it frequently contains mercuric chloride as an impurity It is only used medicinally as an external application for the cure of parasitic affections. Swallowed it has caused severe symptoms in several cases and at least one death. Chronic poisoning has arisen from its external application. Cases of recovery after swallowing thirty forty and one hundred grains are recorded (4) Oxide-Red precipitate -This in its usual form is a red powder, slightly soluble in water Heated strongly. it decomposes, with evolution of oxygen When prepared by precipitation it is yellow in colour, and in this form is contained in the Lotio hydrargyri flava BP Cases of poisoning by it are rare A fatal case from swallowing an ounce, and a case of recovery after swallowing half an ounce have been reported (5) Sulphide Cinnabar or 'Chinese Sindur' Vermilion Hin gula (Mar) Hingul Rasa sindura or Shingarf -This is met with either as a dark red crystalline mass, or as a bright red powder It is only soluble in nitro muriatic acid and is entirely volatilized by heat No acute case of poisoning by it in man has been met with but cases of chronic poisoning have occurred from its use as a colouring matter for vulcanite plates supporting artificial teeth A case of chronic poisoning from its over use as a fumigant is referred to by Taylor (6) Methide -In two cases of slow poisoning by inhalation of mercuric methide vapour, in addition to salivation there was impairment of the special senses of motor power and of the cerebral functions generally In one of the two death took place by coma In the other the patient became idiotic and after remaining in this state for a year died of pneumonia

Gase—Sulpho-cyande of mercury possoning—In 1865 a Pharach's Serpent was swallowed by an adult made who in consequence suffered from pain dyspinca vormiting and rigors but ultimately recovered Blythe records an experiment in which 0.5 gram (about 74 grams) of the posson administered to a p geon killed the bird in 40 hours without convulsions. The bird was indeposed but no other symptoms were noted in November 1904 a case in reported by Dr. O. L. Bose—Tranggin a suity Hinda ternale child aged it months too by accident Tranggin a suity Hinda ternale child aged it months too by accident Dranggin as the start of the start of the start of the previous night which was the Deval. The contents of the baket were removed on the next morning and some parched rice was given to the child in the same bakets but one prece of the toy remained in the baket undetected and this the child took with the parched rice. The child experienced a diasgreeable taste which found expression in her face and

<sup>&</sup>lt;sup>1</sup> This vernacular name China Sindur is because it comes from China as distinguished from the ordinary Sindur called Matiya Sindur or earthy lead oxide

which attracted the attention of the attendant, who not his fineer into her mouth and brought out a small quantity of a jellow sulphur like staff, which was at once recognized to be a portion of the toy | Shortly after she began to come attended with severe retching. The matter first brought up consisted of froth, mucus mixed with the pale vellow substance she had taken ble vomited several times within half an hour: she was then removed to a neighbouring dispensary, where she was given two doses of sulphate of zinc (15 grains each) followed by warm water drink This brought on copious vomiting. The vomited matter was of a vellowish colour mixed with much murus 'it about 8 AM. the child was brought to me She was weak and sleepy apparently from exhaustion otherwise she was not bad I advised small quantities of a mixture of mulk and eggs to be given to her at frequent intervals with 16 drops of brandy The child brought up the first two doses of the egg mixture, but after that there was no more vomiting. The child remained sleep, and prostrated for about three hours, and then began eradually to recover The bowels were not moved and she made water for the first time at 8 PM, after the ingestion of the poison, and then freely again at about 5 30 PM She had fever in the evening (temperature 101° F) which kept on during the night. There was no more vomiting and no purging She slept well during the night and was found all right next morning As in the case of porsoning by other salts of mercury, the symptoms were of an irritant nature

On chemical analysis of the substance mercury and sulpho cylinic acid were detected and when burnt, it kindled and swelled into a bulky

snake like mass

Mercurous compounds - Insoluble or spannely soluble mercurous compounds are much less actively irritant than similar mercuric compounds Mercurous compounds are, however, prone to become converted into mercuric compounds. Some mercurous compounds eg the oxide and iodide, undergo this change spontaneously, or under the influence of hight only Others, eg calomel are more stable, but this even is hable under certain conditions to become converted in the body into Of the sparingly soluble or insoluble mercuric chloride mercurous compounds, the only one of medico legal interest Mercurous chloride. Calomel- Ras-Lafur, 'mercural camphor, on account of the vitreous camphor-like appearances of the masses of crude calomel, which is in India largely mixed with perchloride Calomel occurs as a heavy, white, crystalline mass or amorphous powder almost tasteless, and insoluble in water, alcohol and other. It is entirely volatilized by heat and is blackened by solution of ammonia. The ras kafur of the Indian bazaars contains a considerable but varying quantity of corrosive sublimate. An ordinary medicinal dose of calombi is two to five grains. In large doses it acts as an irritant poison, and in exceptional cases fatal salivation has been caused by ordinary medicinal doses. At the temperature of the body calomel is liable to be converted into corrosive sublimate by solutions of sodium or potassium chloride, and specially by

solutions of ammonium salts. In at least the following two cases death appears to have resulted from this transformation.

Cases -- Mercurous poisoning -- Fatal result attributed to the conversion of calomel into corrosive sublimate -(a) (Edinburgh Med and Surg Jour, vol liv, 1840, p 250) —A physician prescribed for a child, powders containing in each 4 a grain of calomel, 5 grains of ammonium chloride, and 5 grains of sugar. After taking a few of these powders the child died, with all the symptoms of poisoning by corrosive sublimate anothecary who made up the prescription was charged with causing the death of the child, it being supposed that he had by mistake substituted corrosive sublimate for calomel This led to experiments being instituted, the result of which was to clearly show that calomel, by the action of ammonium chloride solution, is at the temperature of the body, and even at ordinary temperatures, decomposed, with formation of mercuric chloride and metallic mercury (b) (Bo Chem Analyser & Rept ) In the year 1860 the following case was referred to Dr Haines, then Chemical Analyzer. Bombay, for opinion A soldier in hospital at Canton, suffering from fever, was ordered pills, each containing three grains of calomel, two to be taken every two hours with two spoonfuls of a mixture composed as follows -Ammon sesquicarb 511, Liq ammon, acet 5v1, Water 5v1. After two doses symptoms of gastric irritation came on but two more doses appear to have been taken before the medicine was stopped several days treatment the man died, and after death violent inflammation and ulceration were found in the stomach and pharynx. Experiments made by Dr Haines with reference to this case showed that, at the temperature of the body solution of acetate of ammonia decomposes calomel, with formation of mercuric chloride and metallic mercury the action being more rapid if excess of carbonate of ammonia is also present

Metallic mercury — Pana Para, or liquid metallic mercury when swallowed even in large quantity (one to two pounds) seldiom produces any ill effect. In exceptional cases however (Cases below), symptoms of chromic mercurial poisoning have been produced. A popular belief appears to exist in some parts of indus to the effect that liquid mercury, when swallowed, causes injury to health. It was administered with this object in Cases (b) (c) and (d). Metallic mercury in yapour, or in fine division, readily acts on the system, hence worknen in mercury mines, larometer makers, mercurial gliders and platers, and others who are constantly exposed to intercury vapour, are liable to suffer from chromic mercurial poisoning especially from mercurial tremors. The action of mercury in the division is very similar to that of an insoluble mercurous salt, and in fine division it may be absorbed through the unbroken skin, and cause chromic poisoning. Mercury in fine division forms one third by weight of Plulia hydratgyri BP and IP (blue pill), and Hydratgyrium currents BP and IP. The finely divided mercury contained in the latter preparation is in hot climates, liable to undergo conversion into mercuring code, the preparation as a consequence becoming poisonous

'Ogast - Mercurual pousoning - Metallic mercury swallowed -(a) (Taylor, Postons, p 260) For the purpose of causing abortion, a guit swallowed 44 ounces by weight of mercury it had no effect on the uterus, but in a few days she suffered from a tembling and shahing and the state of the body (mercurual tremors) and loss of muscular power These symptoms continued for two months, but there was no salvation, and no blue mark on the guins --(b) (Bengal Med Legal Rep., 1869). The following case was referred to Dr Bateson, Civil Surgeon Umbolls

An individual was charged with attempting to poson a woman by administering to her highd increary in food. The worman is said to have vointed twice after taking the mercuralized food, and to have had "ar ed swelling of the gims, with bleeding on pressure of the finger," attributed by this sub-assistant surgeon who saw the case to the action of mercury. At the first inquiry the charge heads down, owing to the office of the finger, the property of the first property of the pr

It may be remarked that in above case (b) the question arose, Is liquid mereury a poison? On this point Taylor says "Although liquid mereury is not in itself poisonous it is liable to be converted into poisonous consumers of the poisonous consumers."

Outside the poison of the pois

# Detection of Mercury.

mercury sometimes acts as a poison,

Elimination of absorbed mercury takes place mainly by the urine and saliva, and may be rapid or slow. The first is most likely to occur in cases of acute poisoning by a soluble mercurial salt, such as corrosive sublimate. Mercury was found to be completely absent from the viscers in a fatal case of poisoning by corrosive sublimate lasting only four days, and Taylor agrees with Orfila in considering that, if in soute poisoning by corrosive sublimate lasting only four days, and Taylor agrees with Orfila in considering that, if in soute poisoning by corrosive sublimate the individual survives fifteen days, it is probable that no mercury will be found in the body. Hence death may occur from mercural possoning, and analysis fall to detect the presence of mercury. On the other hand, elimination of mercury occurs in some cases very slowly, and mercurial preparations are often used in the treatment of disease. Hence the discovery of mercury in small quantity in the viscera of a deceased individual, is quite consistent with the supposition of death from causes other than mercural poisoning.

Solid compounds are most readily identified by reduction The compound is mixed with powdered sodic carbonate, or powdered sodic carbonate and powdered charcoal, introduced, into a test-tube and heated, when globules of metallic mercury sublime I is solution—

Mercuric salts2 give (1) a vellow precipitate with potassic !

<sup>1</sup> Potsons p 980

<sup>\*</sup> If the salt under examination 19 mercune cyanids, it should be decom posed by HCl before other reagents are added

hydrate, (2) a white precipitate with solution of ammonia (3) a scarlet precipitate with potassium rodide soluble in excess (4) no precipitate with hydrochloric acid (5) a white precipitate subsequently becoming grey or black with standous chloride and (6) with sulphuretted hydrogen, a precipitate at first white subsequently orange and lastly black. Mercurous svils give (1) a black precipitate with potassic hydrate or solution of ammonia (2) a white precipitate with hydrochloric acid or chlorides blackened by ammonia (3) a black precipitate with sulphuretted hydrogen (4) with potassium rodide solution a green precipitate soon changing to grey if excess be added.

In organic mixtures mercury may be detected by Reinsch's process—On heating the coated copper a sublimate of globules of metallic mercury is obtained Or the matters having been boiled with dilute hydrochloric acid (1 to 4) the solution may be treated by the galvanic deposition process as for antimony using gold foil in place of platinum foil. The coated toil is then heated in a tube as in Peinsch's process (p 513). Quantitative estimation of mercury may be effected by precipitating it as sulphide. Corrosive sublimate present in sufficient quantity in organic mixtures may be separated therefrom by exhaustion with ether.

### Zinc

Poisoning by this metal is rare in India and usually accidental from swallowing either the sulphate or the chloride. Of these the first is a non corrosive and the second a corrosive irritant. Besides their local action zinc compounds when absorbed exert a remote specific action on the nervous system causing great prostration of strength collapse convulsions and in some cases impairment of special sensation eg of smell sight and taste

Zinc sulphate, white vitriol ZnSO<sub>4</sub>—Safet tutiya 1—This is a white crystalline freely soluble salt the crystals of which closely resemble in appearance those of magnesium sulphate? In a few instances zinc sulphate has been used criminally but as a rule cases of poisoning by it are accidental and arrise from its being mistaken for magnesium sulphate. When swallowed it rapidly causes free vomiting leading to complete or almost complete ejection of the poison hence fatal crises are rare Symptoms—The usual symptoms of non corrosive irritant

se White metallic salt

<sup>\*</sup> And also those of oxal c ac d.

possoning with cramps convulsions and great prostration of strength Post morten appearances—Those of irritant poison ing Dose—The least quantity likely to prove fatal cannot be stated with certainty. Half an ounce has caused death but a dose of two ounces has been recovered from As an emetic zino sulphate is given in doses of ten to thirty grains but it should be borne in mind that zinc sulphate is a poison. Hence if, as is sometimes the case in narcotic poisoning vomiting is not produced repeated doses are to be avoided. Acetate of zino appears to act similarly to the sulphate, and may be used instead of it as an excite.

Zinc chloride. ZuCla -This is a white very soluble and very deliquescent salt easily fusible and in the solid condition often met with in cylindrical sticks A strong solution of itover 200 grains per ounce-is sold as a disinfectant under the name of Sir William Burnett's disinfecting fluid Cases of poisoning by zinc chloride are usually accidental and most commonly arise from swallowing Burnett's fluid A case how ever is recorded where death resulted from the application by a quack of zinc chloride as a caustic to a cancerous breast Symptoms -- When swallowed in concentrated solution as is usually the case the symptoms are those of corrosive poisoning followed unless death occurs rapidly by nervous symptoms og muscular weakness tetanic convulsions impairment of sight etc Post mortem appearances - The lining membrane of the mouth and throat may be found bleached and white or abraded and inflamed. The gastric mucous membrane has been found grey and corrugated or inflamed and in places destroyed, in one case the stomach was found perforated in two places Where life has been prolonged contractions of the gullet and stomach have been found Dose - Severe symptoms have been produced by twelve grains of the chloride Half an ounce of Burnett's fluid has caused death but recovery has taken place from doses of one to one and a half onnees

Treatment of zinc poisoning—The usual treatment for corrosive or non corrosive irritant poisoning according to the case. Carbonate of soda should be given as an antidote Albuminous fluids may also be administered.

Detection.—Solutions of zine salts (1) acidulated with HCl give no precipitate with sulphuretted hydrogen, (2) give a white precipitate with ammonium sulphide (3) give a white precipitate with ammonia solution soluble in eveess (4) give a white precipitate with potassic hydrate solution soluble in excess and forming a solution from which sulphuretted hydrogen throws down a white precipitate, (5) if a solution of a zinc salt be precipitated with sodic carbonate, the solution boiled, and the precipitate collected and ignited with a little cobali mitrate solution in a platinum dish the residue in the dish becomes bright green. From organic mixture, zinc may be separated by burning away the organic matter. The ash may be dissolved in dilute acid, zinc obtained from the solution as sulphide, the sulphide dissolved in a little nutric acid, and the solution trevted as in (3) above

## Copper.

In India attempts at homicide, by the administration of the sulphate of copper in food or sweetment, are not uncommon, but the strong disagreeable metallic taste of this and other soluble copper sults, prevents their being used homicidally to any great extent

Acute copper poisoning.—The accidental cases of poisoning by food cooked in copper vessels, tolerably frequent in India, are probably ptomaine or bacillary infection. Suicidal cases (see Case below) and cases where the poison has been taken with intent to cause abortion, and homicidal cases (see below) are occasionally met with and a fatal accidental case in a child, from sucking pieces of the sulphate has been reported

Case—Sulphate of copper possoning—Sucide —A Eurasian lady in Calcuita, in 1897, took a large quantity of sulphate of copper, and died from the effects thereof. The mucous membrane of the stomach and upper intestines were stauned blue. About 38 6 grains of sulphate of copper were recovered from the stomach alone. Copper sulphate is marely used as a posson, either for homicidal or suicidal puriposes, on account of the large dose which is necessary its disappreceable taste the great pain which it causes and its uncertain results —L. A. Waddell. Beng. Chem. Ex. Pept, 1802.

Case—Sulphste of copper—Homendal poisoning—In 1880 a whole family were poisoned (not fatally) by a discharged khitmatgar introducing blue vitriol into the food—Sulphate of copper was detected in the remains of food—Dr Warden Beng Chem Rept for 1880

Symptoms.—A strong metallic taste in the mouth, followed by violent vomiting, and the usual symptoms of non-corrosive irritant poisoning. The voinited matters are usually bluish or greenish, becoming deep blue on addition of ammonia (coloration due to bile is unaffected by ammonia). In severe cases these irritant symptoms may be followed by convulsions paralysis, and insensibility. In severe cases, also, suppression of urine is common, and jaundice, not present in arsenical or mercurial

poisoning, is a tolerably constant symptom. Fatal cases are rare. One ounce of the sulphate has caused, and probably less might cause, death, but doses of more than an ounce have been recovered from. Death has occurred (in the case of the child mentioned above) in four hours. In adult cases the fatal period is usually about three days. Post mortem signs.—Those usual in non corrosure irritant poisoning, plus a yellow tinge of the body, and a blue or green colour, deepened by ammonia, of the contents of the stometic and intestines. Perforation of the intestines has been observed.

Treatment.—The usual treatment for non corrosive irritant poisoning, with the administration, as an antidote, of albumen or albuminous fluids.

Chronic copper poisoning.—This has been met with, but is not coumon, among workers in metallic copper and its salts. It is also reported to have arisen from the use of plates as supports for artificial teeth, made of gold largely alloyed with copper. More frequently chronic copper poisoning has been traced or attributed to the contamination of articles of food with copper. The presence of copper, however, in articles of food habitually consumed, provided the quantity present be minute only, does not seem to give rise commonly to chronic poisoning. Symptoms.—At first lassitude, giddiness and headache, loss of appetite, and a conviant metallic tasks in the mouth. Afterwards, great murcular debility, a constant desire to voint, and diarrhea with colicky pains. A purple or green line may be present on the guins, and in some cases the hair is said to have acquired a greenish int. Acute colic, with constitution and local paralysis (symptoms of chronic lead poisoning), are absent in chronic copper poisoning. Tret-ment.—General, as indicated by the symptoms, and immediate removal from toxic influence.

Contamination of articles of food —Copper saits have been used to colour pickles, preserved fruits and vegetables, and confectionery. Sulphate of copper also has been added to bread in order, it is said, to promote the fermentation of the dough, and make the bread whiter Articles of food are very liable to become accidentally contaminated when prepared or kept in copper versels. Ohe metables copper (1) pace wat'r has no action if the copper be clean and the air excluded, but if the water is bolled in contact with the copper, and air be present, solution takes place. (2) the solvent action of water on copper is increased when saine matters, especially ammonium sails and chlorides, are present in solution therein, (3) acid and

fatty food materials, boiled and allowed to cool, even in perfectly clean copper vessels, take up copper, but acid food materials boiled in clean copper vessels and poured out at once, do not dissolve the metal, (4) in all cases the liability to contamination is greater if the copper vessel used is dirty. Copper cooking vessels are frequently tinued inside for protection, the tin used should be free from lead, otherwise chronic lead poisoning may result

Metallic copper, except in very fine division, may be regarded as inert. Cases of chronic poisoning among coppersmiths, from constantly handling metallic copper, have been reported in England, and also cases among workmen using, as in certain printing processes, copper in a state of very fine division.

Sulphate of copper, or "Blue Vitrol," Mora tut or Nila tuta, is readily obtunable in India, and it occurs in blue, efflorescent crystals, which, when heated, lose water and fall into a colourless powder. The salt is very soluble in writer, its solution responding to the tests for copper and combined sulphune and Medicinally it is given internally in one-quarter to two grain doese as an astringent, and in five to ten grain doses as an emetic. A few cases of its use in India, as a human and cattle posson, have been met with

Gase—Copper sulphate as homicidal posson—In a fatal case of suspected poisoning by a husband of his wife s paramour, at Goalpara, Assam, in 1919 copper sulphate was found in the vomit and stains on the clothes of the deceased, and copper saits in the viscera—Hennath Adhil ari, Hengal Chen. Ears Rept, 1919.

Subacetate or "Verdigris"—Zangal or Pttra Several subacetates of copper exist, all compounds of normal cupric acetate and cupric oxide. They are blue or green in colour, partly soluble in water, are used as pigments, and appear to be as poisonous as the sulphate. Half an ounce of the subacetate has proved fatal to an adult. Food contaminated with copper, desired, from vessels in which, it has been prepared on kept, commonly contains copper either as subacetate, or as curbonate (natural "Verdigris"). The subacetate, prepared by boiling or steeping metallic copper in an acetoms organic fluid, is a common popular einette remedy in India in cases of poisoning

Other copper salts.—Green verditer and blue verditer, both oxycarbonates, and Brunswick green, an oxychloride of copper, all used as pigments, are poisonous So also are the arsenite and aceto-arsenite (see p v 496)

The symptoms

produced by these last two compounds, however, are those of arsenical porsoning

Detection -Copper in minute quantity is nearly always present in the human liver and kidneys, and in the liver and kidness of domestic animals Traces of copper have been detected also in wheat and burley, and in a large number of vegetables Articles of food, again, frequently contain copper in minute quantity as an accidental impurity ! Hence the detection of copper in minute quantity in human viscera is quite consistent with death from a cause other than copper poisoning Solutions containing copper give (1) a dark brown, almost black, precipitate with sulphuretted hydrogen. (2) a blue precipitate with ammonia, dissolving in excess with formation of a deep blue or purple solution, (3) a blue precipitate with potassic hydrate, insoluble in excess, (4) a chocolatebrown precipitate with potassium ferrocyamde, and (5) when slightly acidulated with sulphuric acid deposit metallic copper on a clean from wire Organic matters containing copper may be incinerated the ash treited with nitric acid, again incinerated, and the residue dissolved in dilute hydrochloric acid, the solution is then filtered and tested for copper as above. Or for quantitative estimation, the solution may be poured into a weighed platinum dish, a piece of metallic zinc added this dissolves the copper deposits on the dish as metallic copper, and after washing and drying may be weighed in this form

## Lead.

Led poisoning is not common in India. It is usually acidental It may be acut or chrome. In acute cases the symptoms are those of non-corrower irritant poisoning, except that there is constipation not diarrhea. In chronic cases, much more frequently met with than acute cases, the characteristic symptoms are colic and local paralysis met with accidentally in painters, typesetters and men in charge of storage batteries

Acute lead poisoning: symptoms — When a soluble compound, eg the acctate, is swallowed, a burning pain in the mouth and threat comes on soon after swallowing the poison, followed by vomiting and afterwards by colic with constipation. The faces, if any be passed, are black. Crainps of the flexors follow, and there may be paralysis of the extensors and a blue.

<sup>&</sup>lt;sup>1</sup> Traces of copper are frequently present in native liquer. Lyon found traces of copper in about 80 per cent of a large number of samples purchased in different districts of the Bombay presidency.

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line on the guins, as in chronic poisoning. Giddiness, stupor, and even come have been observed. Sparingly soluble compounds cruse similar effects, except that the first symptoms do not appear until some hours after swallowing the poison. Fatal cross are rare. Post montem appearances.—More or less redness of the nucous membrine of the alimentary canal may be found, but this is not always present. Treatment.—Promote vomiting or use the stomach pump, and then give sulphite of magnesia as an antidote. Subsequently, opium may be required to relieve prun, and purgatives to overcome constiprtion.

Cases —White Lead poisoning by matake for Betel lime—Two cases are reported by Dr. C L. Bose of poisoning by white lead which was ecudentially used by mistake for betel lime. The poisoned betel was remarked to be bitter in taste and used continuously for three days, on the fourth day severe colle and vomiting occurred with blee ling from gums but no paralysis. Both recovered Lead was detected in the urme of one of the men about six weeks after the poisoning—Calcutta Mel Jour, February, 1016

Chronic poisoning,--- May arise from swallowing, inhaling, or external application of lead or its compounds. Hence it is met with in those whose occupation exposes them to constant contact with lead or lead compounds, and is also met with as the result of wilful or accidental contamination of articles of human consumption or use with compounds of lead In chronic lead poisoning, lead colic, or lead palsy, one or both may be Lead colic, painter's colic, or colica pictonum -In this the prominent symptoms are at first, indigestion, constipa tion, and feeling of depression, with loss of appetite, thirst, a metallic taste in the mouth and fector of the breath, wards there is pain about the umbilious, usually relieved by pressure hard obstinate constipution, and quick, shallow The urme is scanty, there is a blue line on the gums, and sometimes delirium at night. Vomiting is a common symptom but febrile disturbance is rire Lead palsy -This may be the first to appear, or it may follow after one or more attacks of lead colic. It usually commences in the extensor muscles of the hand and forearm, causing wrist-drop. Afterwards the muscles of the lower extremities may become affected, and even the muscles of the trunk As in lead colic, there is a blue line on the gums Blue line on the gums is believed to be due to a deposition of lead sulphide in the capillaries, and is rarely absent in chronic lead poisoning. A similar line has however, been observed in chronic poisoning by other metals eg mercury and silver Other effects of lead on the system are (1) it checks the elimination of unc acid, predisposing, therefore to gout, (2) insanity in some cases, it is believed, in

traceable to chronic lead poisoning; (3) in pregnant females lead poisoning predisposes to miscarriage, and it (4) may cause albuminuma

Chief occupations exposing to risk of lead poisoning are lead miners, smelters, and refiners, plumbers, pipe layers, printers and type founders Lapidaries barmen, and fish mongers also suffer, the first from bandling masses of lead in which precious stones are embedded while being cut, the second from constantly handling pewter pots, and the third from contact with wet, lead covered surfaces, on which fish are commonly exposed for sale Again, cupellers, makers of white and red lead and other lead compounds, painters and dyers and others using lead pigments, flint glass makers, and potters using lead glaze, are all liable Chronic lead poisoning in non workers in lead is most frequently due to accidental contamination of drinking-water with lead. It may, however, arise from accidental contamination or wilful adulteration of matters other than drinking water Contamination of drinking water - Pure water has no action on lead if air be excluded, but if air be present lend hydroxide, slightly soluble in water is formed This, by the action of carbon dioxide, becomes converted into a basic carbonate of lead insoluble in water but soluble in solution of carbonic acid. The solvent action of water on lead is favoured by the presence of ammonium salts, especially ammonium nitrate On the other hand, sulphates, phosphates and carbonates retard or prevent the action | Hence drinkingwaters, free or nearly free from ordinary saline impurities, are especially liable to contamination from lead pipes, lead lined cisterns, etc.

Accidental contamination of other matters.—This may arise from the article having been made, or from its being preserved, in vessels made of or soldered with lead, or in earthen ware vessels glazed with lead glaze, or other vessels painted inside with a lead point Sometimes the contamination is mechanical in character, assisted, perhaps by oxidation of the lead eg chronic lead poisoning has arisen from the use of flour ground with stones filled in with lead, and from the use of farmaceous foods, or snuff, or tobacco, wrapped in lead foil In other cases, the contamination arises from a solvent action exerted by the article, such action being specially liable to be exerted by (1) fatty and saccharine matters, and (2) acid matters (except those acid from the presence of sulphuric acid) Thus milk kept in lead or lead glazed pans, sugar made in lead vessels, and soup kept in lead soldered tins are all hable to contamination. Again, chronic lead poisoning has

ansen from druking oider and beer conveyed in lead pipes, from druking wine contained in bottles in which shot, used for cleaning them, have been carelessly left, from cating pickles contained in lead cipped jars, and from druking new rum contaminated with lead from the lead worm of the distilling apparatus. Old rum, however, is generally free from lead, owing to its precipitation as an insoluble compound, by tannic acid contained in the wood of the casks in which the rum is kent.

Wilful adulteration, etc.—Acetate of lead has been added to cheap wine in order to sweeten it. Red lead and chromate of lead have been used to adulterate snuff, and to colour articles of confectionery. Chronic lead poisoning has arisen from the use of hair dyes, cosmetics, and lottons, containing lead, and from the external application of white lead as a dressing to a scalled surface.

Chronic poisoning is sometimes met with in India as the result of the contamination of drinking-water, and also as the result of the administration of oxide of lead in quack medicines

Treatment and prophylaxis.—In chronic lead poisoning the first indication of treatment is immediate removal from the toxic influence. In the case of non workers in lead the dis covery of the toxic influence is frequently a matter of difficulty, necessitating the analysis of all matters habitually used by the patient Colic may be treated by a combination of purgatives and anodynes eg Epsom salts and senna followed by opiates. In both lead colic and lead palsy either soluble sulphates or lodide of potassium may be given, or the two may be combined, each dose of todide of potassium being followed after an interval of two hours by a small dose of sulphate of magnesia Workers in lead should be recommended extreme cleanliness, the least possible contact, and the use as a drink of very dilute sulphuric acid Every precaution also should be taken to remove or keep down lead dust in the workrooms The following processes have been recommended for the protection of drinking water conveyed in lead pipes (1) lining the pipes with tin, and (2) keeping the pipes filled for some time with water watering sulphates, or with a solution of an alkaline sulphide Where, however, a water is liable to contamination, the use of lead pipes, lead lined cisterns, etc., should be entirely avoided

Metallic Lead is generally regarded as powerless to cause acute poisoning A case, however, is reported of semi-acute lead poisoning from swallowing small shot, and another where death resulted from accidentally swallowing a quantity of melted

lead, the lead in this case acting as a mechanical irritant Chronic cases, due to the action of metallic lead, are often met with.

Soluble Lead Salts —(1) Acetate of lead, sugar of lead —
This is a white crystalline salt, very soluble in water, sparnely
soluble in alcohol, and insoluble in ether, hented, it chiris, yielding no sublimate it is not very poisonous, and his been given
in divided does to the extent of eighteen grains, or even more,
daily for a week or ten days without ill effect. The same
quantity in minute doses, spread over a longer period, would
be far more likely to cause serious symptoms. One ounce has
often caused acute poisoning. Tatal cases are rare. (2) Subacetate, Goulard's extract, is generally met within strong solution,
formed by digesting strong solution of the normal acetate with
Pho. The colution is frequently milk, owing to the acetan of
atmospheric carbon diovide. Its action is similar to that of
the acetate. (3) Nitrate of Lead a white crystalline salt, very
soluble in water, but insoluble in alcohol, is probably as a
prossonous as the acetate.

Sparingly Soluble or Insoluble,-(1) Ltharge-Monoxide of lead, Massicot - Murdasang, yellow or reddishyellow in colour, is slightly soluble in water. Two table spoonfuls of it have been swallowed without ill effects Chevers, however mentions two cases of chronic poisoning, arising from its use by quacks in India as a cure for syphilis one, serious symptoms came on after swallowing twenty-five grains daily (mixed with white sugar) for five days. In the other, two sowars (troopers) suffered from lead colic, after swallowing on each of three successive days, one hundred and twenty gruns of litharge mixed with sixty grains of 'bans lochan (tabashir) In Europe, litharge has often given rise to chronic prisoning, frequently indirectly, from the solvent action of acetic fitty, or other acids upon it (2) Red Lead Minium— Sindura - The toxic action of this is similar to that of lithange Laylor meditions a case where a woman recovered after swallow-ing 2) outces. In this case no symptoms appeared for nice hours RM lead (in the Bombay Presidency, and possibly in other parts (of India also) often forms an ingredient of the paste used for arrying abortion sticks (see p 314) In a case recently tried in Bon'bay, a woman a professed abortionist convicted of causing mischringe, was found to have in her possession a number of sticks so armed Red lead, alone or mixed with arsenious oxide, is sometimes in India employed as a cattle poison (3) White Lead or carbonate of lead, PhCO, containing a variable quantity of lead bydrovide, is incoluble in water, but soluble in dilute acids One fatal case of acute poisoning by it in a child at five, is mentioned by Taylor In this case, although no urgent symptoms were present for three days, the child died in ninety hours

(4) Chloride of Lead, PbCl<sub>1</sub>, slightly soluble in cold, more soluble in boiling water, hea in one case—non fatal—caused acute personing. An oxychloride is also met with, used as a paint, under the name of Turner s yellow (5) Chromate of Lead, PbCO<sub>1</sub>, a yellow insoluble salt, used as a paint under the name of chrome yellow, has, in one or two instances—owing to its having been used to colour confectioners—caused fatal acute known as 'ti gui' (6) Sulphate of Lead, PbSO, a white insoluble salt, is said to be inert. But Woodman and Tuly remark that this is doubtful, as "cases are recorded of sempstresses being poisoned by suching threat mixed with sulphate of lead, for the purpose of increasing its weight" (7) Sulphate of Lead, Galena, PbS—This, like sulphide of antimoxy, is sold in India under the name of Surma, for use as a collyrum. Osing to its insolubility, it is probably either inert or only very slightly active. No case of posoning by it appears to have been recorded.

Detection -Lead salts in solution give (1) (except the solution be very weak), with hydrochloric acid, a white precipitate not dissolved or blackened by ammonia, but soluble in boiling water. (2) with sulphuretted hydrogen in slightly acidulated solutions, or with ammonium sulphide in neutral or alkaline solution a black precipitate, (3) with potassic hydrate, a white precipitate soluble in excess, (4) with potassium iodide, a yellow precipitate soluble in boiling water, and crystallizing out on cooling in minute silky crystals, and (5) a yellow precipitate with I ofassium chromate. Insoluble lead compounds (the sulphide and sulphate excepted) are readily dissolved by nitric acid. The sulphide is only partly dissolved by boiling with nitric acid, the remainder being converted into sulphate The sulphate may be identified by boiling it with carbonate of ammonia solution, this converts it into carbonate, which, after separation and washing, may be dissolved in acetic acid, and the solution tested for lead From organic mixture lead may be recovered from incinemation, the ash, if treated with sulphure acid and again incinerated, yields sulphate of lead, which may be decomposed and brought into solution as above

## Other Metals.

Tin—The only compounds of this metal of medico legal interest are stannous chorde, SnCl<sub>2</sub>, and stannou chlorule. Solid crystalline hydrates of these salts may be met with, but more commonly the salts are met with in strong each solution. They are used as mordants in dyeing, and are active irritants. Cases of poisoning by them are rare Solution of carbonate of ammonia and albumen are indicated as antidotes. Bismuth—Bismuth poisoning is more common now that 'Bismuth neals' are given for X ray purposes. In one, an adult died in mine days from 3ú of the submittate, in another, recovery too, place the submittant of the fatal case single costs of the submittant of the fatal case single procession for the submittant on the fatal case single procession of the submittant on the fatal case single procession of the submittant of hemittant in the fatal case single procession of the submittant of hemittant in the fatal case single procession of the submittant of hemittant in the fatal case single procession of the submittant of hemittant in the fatal case single procession of the submittant of hemittant in the fatal case single procession of the submittant of hemittant in the fatal case single procession of the submittant of hemittant of the submittant of hemittant of the submittant of hemittant of hemittant of the submittant of th

Silver—The only salt of this metal of toncological importance is the function of the transfer of the transfer of the cases, caused death. Acadental poisoning by this salt sometimes are from a portion of a stock slipping down the throat while being used a caustic. Common sell is the best authorite. In chronic poisoning tailver, a blue line appears on the gums and the whole surface of the body, in time, assumes a greyish blue or black colour.

## Alkaline and Earthy Salts

Certain alkaline and earthy salts, poisonous only in larg does, may conveniently be considered under this head. Case of poisoning have been reported from large doses of th following —

Sodium chloride, Common Salt.-This, in large dose acts as an irritant poison. Half a pound has caused death with symptoms of irritant poisoning followed by paralysis Potassium nitrate, Nitre, Saltpetre, sal prunelle, Sorakhare in doses of an ounce or more, has, in several instances, cruse In one case, however, recovery took place afte swallowing six ounces When swallowed in poisonous dose: besides acting as an irritant, it acts remotely on the nervou system, causing great prostration of strength, and, in som cases convulsions and partial paralysis Suppression of urin also has been observed. In some of the fital cases death has occurred rapidly, eg in two hours and in three hours Potassium chloride, in large doses, acts as a poison, giving rise, in children tourntant symptoms with lividity of the surface and collapse and in adults to nephritis One ounce may be regarded as fa al dose for an adult, and two drachms has caused death I fildren Acid potassium sulphate, bisulphate of potash sa holychrest, sal de duobus, in large doses, acts as an irritau ison, ten drachms has caused death in two hours The salt some countries, is popularly believed to possess the power of causing abortion, and fatal cases have arisen from it im altrities sulphate of zinc and arseniate of potash. Potassium bits grate (see 'Tartaric Acid') Common or potash Alum Phalat -This also, in large doses, acts as an irritant poison and this, in one or two cases, caused death. Burnt alum, o alum deprived by beat of its water of crystallization, has a slight quastic action. Sulphate of magnesia, Epsom salts—Christian mentions a remarkable case of poisoning by this salt. A boy, teed ten, was given by his father two onnees of Lpson, salts in a teacupful of water as a lavative. The boy died o colleges within an hour, there was no comiting or purging Another point of medico-legal interest attaching to this salt is the close resemblance its crystals bear to those of oxilic acid and sulphate of zinc

## Mechanical Irritants.

Under this head may be classed all substances which are hable, when swallowed, to cause symptoms of irritant poisoning, solely in consequence of their mechanical action on the parts with which they come in contact

Many definitions of the term 'a poison' exclude such substances. As already pointed out, however, the question whether or no such substances may properly be called poisons, is for nedicio legril purposes in India a matter of little importance. In India, in fact, when it is alleged that an individual has committed an offence by administering or attempting to administer one of these substances of pounded glass, the questions which a medical expert has to consider are. (1) What has been the effect of the administration of the substance? and (2) Is the substance one which it is 'deleterious to the human body to swallow,' or an 'unwholesome thing'? and not, Is the substance 'a poison'?

Substances which, when swallowed, may act as mechanical irritants, are (1) Hard, sharp angular or pointed solid matters, eg pounded glass, pins, and needles (see also 'Salepi McAd,' 'Arums'), and seeds and stones of fruit, (2) Substances which swell largely by imbibition of water, eg sponge, and (3) Laquids at a high temperature, eg boiling water or melted lead. Of these, the following require special notice —

Pounded glass—This, in many parts of India is popularly believed to be a very active poison, and has been used both in attempts at suicide and attempts at homicide. The Bombay Analyzer's records for the ten years ending 1884 show that during that period, this substance only was detected in thirty-one cases of alleged attempted human poisoning. In twenty-three of these it was detected in bread, sweetineat, or some other article of food, in three more in vomited matters, two of these being cases of attempted sweetle by famales, in one case it was found after death in the contents of the stomach of a man (Case below), in another in some pills and in the three remaining cases pounded glass, per se, was sent for identification. In nearly all these cases, the glass found was coloured glass, resembling fragments of bangles, and in two only it was reported that the individuals suspected of having used the

glass with cruminal intent were males. Five cases, "all from the Central Provinces, were of alleged attempted homicide, by pounded glass, all being alleged attempts by vives to posson their husbrinds, and Cheters' mentions a case brought to the notice of the Chemical Examiner, Bengal, in which a servant attempted to posson his master by pounded glass introduced into a mess of spinich, and also a Bombay cise, in which a man seized in the act of committing a robbert, attempted suicide by swallowing fragments of a wine bottle

The more finely the glass is pounded the more likely are the particles to become completely enveloped in mucus, etc., and to be thus prevented from injuring the mucous membranes Hence, as the ill-consequences arising from swallowing pounded glass are solely due to the mechanical injury it inflicts the more finely it is pounded the less likely is swallowing it to cause harm Considerable quantities of pounded glass, in large angular fragments even have often been swallowed without ill offects being produced. On the other hand, cases are recorded where swallowing pounded glass has caused symptoms of irritant poisoning (see Cases below), and there is reason to suppose that in exceptional cases, swallowing pounded glass may even cause death (see Cases below) In Lurope and America it is also employed for homicidal and suicidal purposes By experiment Le Sauvage found that 21 drachins of pounded glass could be given to a cat without injury, and a dog took 6 ounces in 8 days without any obvious symptoms, and Ie Sauvage himself swallowed a considerable number of the particles without inconvenience following

Case—Homendal possoning by pounded glass—In 1897 the cases of attempted poisoning sith pounded glass occurred in Bornbay during the year namely, at the Central Jail, Aerrowda where pounded glass was detected in a pounder given to a warder in the jail who was too realous in detecting tobacco amongst the converts and in a case from Thana where blue poulered glass was detected in the tread prepared for a man by his wife the powder hyving been obtained by pounding her bangles

Case — Posoming by pounded glass — (a) (Christison Posomi, p. 655) — Portial relates a case of a man who undertook for a wager to eat his wine glass and actually availoned part of it. He was attacked with acute part in the stomach, and subsequently with convisions The treatment consisted in giving bulky food (subseq) followed by an N. Sydenhum Noor | Noor Hook for 1805 n | 101) — A woman swillowed a quantity of coarsely pondered glass in order to sour out her stomach Intense pain in the stomach came on, with tenderness, the plushe became

Beng M Inco-legal Rept , 1870-72 p 292
 Med Jur p 287
 In Paris in 1820
 Ldonb Med Sury Jour , 1891, p 225

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small, 100 per minute, there was thirst and pallor. An emetic was give and the next day the urgency of the symptoms had passed off. The worm recovered.

Cases -Poisoning by broken glass -(a) (Christison, Poisons, 653) In a case which occurred in Paris a woman, after a hasty dinne became unwell, and next morning was seized with violent pain in th stomach and vomiting, and died in convulsions. Porty two days aft her death her body was exhumed, black points and patches were found; the bowels, together with a quantity of broken glass. The medical wi nesses differed as to the cause of death (b) (Ibid , p 654) -In a car published by Mr Hebb, a child eleven months old, died of a few day illness in very suspicious circumstances. On post mortem examination th inside of the storach was found lined with a fough layer of mucus streake with blood The villous coat was highly vascular, and covered with nun berless particles of glass of various sizes some of which simply touched i while others lacerated it No other morbid appearance could be detecte in the body (c) (Bo Chem Analyser's Rept 187, 76) -A male adu was attacked with symptoms of irritant poisoning and died in forty eigh hours The mucous membrane of the stomach was found reddened, by not rugose A quantity of powdered glass was found in contents of the stomach. No irritant substance other than pounded glass could be foun in the viscera

Treatment.—This should consist in the administration  $_{\parallel}$  first of bulky food so as to envelop the fragments and then cometics and laxatives

Diamond dust —Diamonds and diamond dust are popularl believed in India to be very poisonous Thus, in the Barod case (p 496), a mixture of arsenious oxide and diamond dus was employed, and Chevers i mentions two Indian cases o attempted sucade by swallowing an unbroken diamond Likpounded glass, any injurious action possessed by diamonds o diamond dust is selely mechanical

Chopped hair.—This also may act as a mechanical irritant Chevers' mentions that a belief exists in some parts of Individual tieger smellers' are poisonous, and states, on the authority of Baboo Kanny Lall Dey, that chopped hau is sometimes used by eattle poisoners Dense concertions of felted hur are sometimes found in the intestines of ruminants. Their shape is rounded, sometimes the surface is smooth, hard, and shiny almost spherical, and they may be a little more than an inclin diameter. They are formed from hairs swallowed by the animals when licking themselves. These concretions have occasionally been mistaken for foreign objects administered with intent to poison the animal

## CHAPTER XXVI

# VEGETABLE IRRITANTS.

A LARCE number of plants yield matters capable of acting as irritant poisons Some of these are simple irritants possessing little or no remote specific action on the nervous system Others are compound irritants causing in addition to irritation cardiac depression e , squills and Llomosa superba, or acting on the brain and stimal cord eg cocculus indicus. A few owe their activity to the presence of an alkaloid or vegetable base, eq struesacre and the veratrums, these may be called alkaloidal irritants' Of the remainder, a few eg cocculus indicus and plumbago zevianica contain crystalline active principles not alkaloids In the great majority however the active principle is oily or resinous in nature. The terminations are and ag are used to denote alkaloids eg strychnine is also called strychina, but the British Pharmacopæia now uses the exclusively The termination in denotes a non alkaloidal substance on picrotoxin plumbagin

## Alkaloidal Irritants

The detection of these and other alkaloidal poisons mainly depends on the elimination of the alkaloid and its recognition by chemical or physiological tests. The elimination of alkaloids from organic mixtures is generally effected by a modification of Stas-Otto process as elaborated by Drigendorff

Dragendorff's process for the separation of plant principles from organic mixtures is in outline as follows: The process essentially consists in

A Preparing an and watery solution of the matters under extinuition by digesting the finely divided matters with water satisfied with salphune and hitering presum, and twee repeating the digestion. To filtrates are mixed, evaporated to a syrup and this is macerated for a day with four volumes of alcohol filtered and the res due washed with spirt. The alcohol is then driven off by evaporation from the alcoholon filtrate water (if necessary) added and the injust littered again.

B Extracting this while still acid by agitation with (1) petroleum ether, (2) betazene, and (3) chloroform. The solients are to be used in the order named, and each, after use, separately evaporated in small portions in suitable dissels: C Saturating the acid watery solition with ammonia (previously removing any residual chloroform by agitation with petroleum ether) and extracting the ammoniacal fluid as in B with, in succession, (1) petroleum ether, (2) benzene, (3) chloroform, and (4) amylic alcohol, and finally (5) drying up the ammoniacal fluid by evaporation with powdered glass, and extracting the dry residue with chloroform. The table here given shows the prenicipal substances likely to be found in the various residues. Non poisonous substances are mentioned in brackets thus (Thermpi.)

	Solvent.	Resi lues from acid flui i	C Residues from alkaline fluid
1	Petroleum ether	Piperine, pierie acid, car bolic acid, camphor, and capsicin	Liquid volatile alkaloids and antine, also strychnine, brucia veratria, emetine and (quinine)
2	Benzene	Cantharidin santonin, di gitalin and (thiene) ela terin colocynthin col chicin and absinthin	Strychnine atropia, and hyoscyamine also (qui nine, cinchonine and nar cotine) brucia physostig ma veratria, aconitia, and emetine
3	Chloroform	Picrotoxin helleborin (cin chonine), digitalein sapo nin, and iervine	Morphine (and cinchonine)
4	Amyl alcohol	· -	Morphine, solanine, saponin, salicin
5	Chloroform	_	Curarine

# The Stas-Otto Process for Isolating Alkaloids.

As modified by Dr E. H Hankin

This 'Stas-Otto' process as elaborated by Dragendorff is, however, far too elaborate for an Indian Chemical Examiner who may have to deal with half a dozen cross of poisoning per day, and who, outside of the Presidency towns, but rarely has to test for more than a few of the common poisons.

The advice that has been given that all basins, beakers, etc, used in the test should be now, is obviously a counsel of perfection that can scarcely be carried out in practice. Sufficient protection against contamination will be obtained if care is taken that all articles used in the tests are washed in running water immediately after use. If for any leavon viscera, etc, have to be left in bottles or beakers for a long time so that organic deposits are formed in their interior, it is advisable that

For details of the process, see Dragendorff on Organic Analysis

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after a preliminary washing they should be left full of water for several days. The effect of the resulting putrefactive processes is usually to loosen the deposits so that they can be readily removed. A hot solution of such soap preparations as Hudson's Extract or Lux, is often useful in the final cleaning of glass apparatus. Hot water is necessary for removing the last traces of these soan solutions from the glass.

The Stas Otto process may be carried out as follows —

(1) The uncert are usually received preserved in alcohol During the time that elapses between the placing of the viscera in alcohol and their examination in the Chemical Examiner's laboratory any alkaloids present will have commenced to pass into solution. The quantity of alcohol that has been used as preservative is usually equal in bulk to the viscera. The bottle or jar containing the viscers should be only two thirds full. That is to say, one-third of its contents is occupied by viscera one third by the added alcohol and one third remains full of air. The object of this is to avoid risk of bursting the bottle in case any gases are given off. The free space also has the advantage that the viscera are well shaken while en route thus adding the penetration of the alcohol.

The viscera should be cut up into small pieces and placed in a large beaker with the alcohol in which they have been

preserved

(2) Refil the portion of the viscera destined for the Stas Otto process in the above beaker after the addition of a few drops of acetic Acid. This is done ly structing the beaker on a water bith. In cases of suspected acounte poisoning it is advisable

not to hert the viscera above 65° (

(3) Filter Most of the alkaloids present are thus obtained with man) impurities in a clear solution in the dicolol. The useera remaining on the filter should be again extracted with alcohol. This second portion of sloohol should be filtered off and added to the first portion.

(4) These mixed filtrates should be evaporated nearly to dry ness. The evaporation should be carried out over a water lath in a current of air. That is to say for this purpose a closed stink cupbornd is not so suitable as a room attached to the building by only one side and the area of whose wills is chiefly occupied by wire gauze and in which arrangements are made for the gas burners to be enclosed in emphasils alone the level of the working benches. The wind blowing through this room is far more efficient in promoting evaporation and removing smelling substances than any arrangment of flues or vacuum urang-ment obtainable in practice.

(5) When the above filtrate has been evaporated to syrupy

consistency, add about 20 c c of water, while stirring and filter A piece of ordinary thin filter paper and a funnel should be used for this purpose — Attempts to histen filtration by means of a suction pump result in loss of time— In the rare cases in which the liquid refuses to filter easily, centrifuging may be employed instead of filtering

(6) Place this watery extract in a separating funnel Add a small piece of litmus paper. See that the reaction is acid. Should this not be the case acidify with acetic acid. Add

50 cc of ether Shake violently for one minute

(7) Lix the separating funnel in a stand and allow it to rest for at least an hour. By this time the ether will usually have formed a separate layer floating on the surface of the watery liquid If the two liquids have not separated some times addition of a small quantity of plaster of Paris and gentlo shaking followed by another rest will cause separation But a far superior method is to use a centrifuge. The small hand or electrically driven centrifuge used in bicteriological laboratories is useless for this purpose. A large and powerful centrifuge is necessary Before placing in the centrituge the tube containing the mixed liquids and its holder must be placed in one pan of a balance Another tube and holder is placed in the opposite pan and water is poured into this second holder until the two tubes balance exactly. The two holders are then placed opposite each other in the centrifuge. If the two holders are not exactly balanced in this way undesirable and even dangerous strains are introduced. In order to be sure that the two holders are of the same weight a some what sensitive balance of good quality should be employed Usually five minutes centrifuging at full speed is sufficient Occasionally a longer time is advisable. When the machine comes to rest the liquids will be found to have separated Sometimes a dense layer of glutinous matter will be found between the ether and the watery layer This may be so dense that it is possible to invert the tube and pour off the ether without its breaking. If this is not the case the watery and ethereal liquids must be poured gently into a separating funnel without shaking Care must be taken to prevent the glutinous layer from passing into the separator as if this happens

<sup>&</sup>lt;sup>1</sup> To dimm sh the risk of the gluss tubes breaking during centrifugalization its sadrashle to take the following precautions. See that there is a div, or ring of rabber at the bottom of each holder on which the bottom of the tube will rest. Before planng the tube in the holder pour some water must be latter. Then the tube when placed in the holder pour some water must be latter. Then the tube when placed in the holder will be to some extent water borne. All tubes showing creaks or flaws should be discarded. The bearings on the centre of the syndle and at the base of the spindle of the centrifuga should be lubricated each time the mechine is used.

and it becomes broken up in the liquid the two liquids will not

readily separate

(8) When the liquids have separated hold the separating funnel with its stem in the mouth of a second separating funnel Open the tap and allow the watery hand to flow into the lower funnel The ethereal layer (the acid ether extract) contains impurities, and may contain certain poisons that do not generally have to be tested for in Indian practice, and may therefore be If the othereal layer is stron\_ly coloured it is thrown away advisable again to treat the acid hould with ether. Further washings with ether followed by repeated washings with chloroform are desirable when testing for certain poisons such for example as strychnine If chloroform is used, it is best shaken with the acid liquid with the help of a shaking machine the above mentioned glutinous layer has been completely removed the chloroform should senarate easily Otherwise further centrifugalization may be required

(9) The more common alkaloids are retained in the acid watery hand in the lower funnel Add to this about 2 cc of chloroform and a piece of litmus paper. Then add 50 c c. of other Shake Add sufficient ammonia to change the reaction to alkaline Then, at once shake violently for at least half a The reason for shaking at once after the addition of the ammonia is that at the moment of liberation by ammonia the alkaloids present are in a condition in which they can in most cases pass readily into the chloroform ether mixture After the lapse of a few minutes they become changed and pass into solution in the ether less easily

(10) Place the separating funnel in a stand. Allow it to rest for some time preferably till next day. In rare cases it

may be necessary to centrifugalize

(11) The liquid will now have separated into two layers, The upper ethereal layer contains most of the alkaloids is called the 'alkaline ether extract. The lower watery layer contains impurities and in cases of opium poisoning will contain morphia and the substance giving the meconic reaction

(12) Tap off the watery liquid See that the piece of himus

paper in the separating funnel is blue

(13) Pour off the ethereal hauld through the mouth of the funnel into a porcelain basin. If traces of the watery liquid come with the ether they will soon settle to the bottom of the porcelain basin and in this case the ether must be poured from the first into a second basin in order to leave these watery impurities behind

(14) Add to the ether in the basin a few drops of a 4 per

cent, solution of acetic acid in water

(15) Evaporate on a water-bath, preferably under a small rotary fan, until only two or three drops of the dilute acid are left. It is preferable (especially in cases of acount poisoning) that the water-bath should be heated to something less than the boiling point, and allowed to cool further as ovaporation proceeds. The evaporated dilute acid may now be tested for different alkalous.

(16) The watery liquid of (11) is now made and and heated. While hot an equal volume of amyl alcohol is added. The liquid is made alkaline with ammonia, and the mixed liquid are violently shaken. Morphia, if present, passes into the amyl alcohol.

(17) The watery liquid separated from (16) may now be subjected to the meconic test,

## Special Alkaloidal Irritants.

The chief alkaloidal irritants are Stavesacre, Aconite, Sabadilla, Hellebore, Colchicum, Laburnum, Emetine, and Apomorphia

#### Ranunculacea

Stavesacre—Delphinum Staphynogria—The seeds of this plant have an acrid taske, and from experiments on animals have been sect tained to act as a compound irritant poison, their special remote action being to cause cardiac depression, and paralysis of the respiratory more ements. They contain several alkaloids, of which the two most important are staphinagrime, which paralyses the motor nerves like curare, and delphinine, which appears to act very similarly to acontine, paralyzing both the spinal cord and the heart. For other pedisons belonging to this order see "Non alkaloidal Irritants" and "Aconite (see "Cardiao Possons, Chap XX).)

#### Melanthacea

Ceradula or Sabadula—Anagres oficunals, Veratrum officuals, Sabadula officunarum or Schemeraulon oficunale—From the fruit and seeds of this plant the poisonous alkaloid, or mixture of alkaloids, used in medicine under the name of veratria or evatrum, is obtained. This is an active poison Tho medicinal does so not twelfile to one eighth of a grain. In over does it causes violent sneezing, and the usual symptoms of irritant poisoning coupled with great depression of the action of the heart and collapse. Veratria also first stimulates and then paralyses the perphetal extremities of the sensory nerves hence a peculiar proxing sensation followed by mumbness is one of the symptoms of poisoning by veratria, this pricking and numbing sensation is said to be more felt in the fingers and toes and an unubing sensation is said to be more felt in the fingers and toes and an the tongue, while in cases of poisoning by acountie,

<sup>1</sup> Commercial veratrine has lately been found to consist mainly of two alkaloids, veratrine and cevadine, both powerfully sternutatory. 550

which has a similar effect on the sensory nerves, the pricking and numbing sensation is more felt in the tongue. The seeds contain about 0.3 per cent of verstras Detection -Verstras may be extracted from organic mixtures by Stas' process, and recognized by the following special tests (1) It excites violent speezing (2) btrong hydrochloric acid dis solves it without change of colour, but on warming the liquid becomes red (3) Strong sulphume acid dissolves it, forming a yellow solution, which cradually changes to orange and finally becomes red, on the addition of bromine water to the sulphurie acid solution, a purple colour is produced

White hellehore, or Veratrum album, and Veratrum winds, American or green hellebore. The rhizomes or root stocks of these, and of other species of veratrum, cause symptoms similar to those caused by veratria ; Twenty grains of white hellebore root has caused death, and probably less would prove fatal Green hellebore root, officinal BP and IP, is less irritant than white hellebore and rarely occasions purging, except this, its action is similar to that of white hellehore root. The medicinal dose of green hellebore root is 1 to 2 grains Tormerly, the veratrums were believed to owe that activity to the same principles as sabadilla Inter, however, it has been found that they contain the alkalouds of sabadilla in small quantity only, and that the alkaloids present in them are chicily jervine, pseudo jervine, rubi jervine and verstralbine, all non sternutatory bases. All four give a play of colours with strong sulphorio acid, the two last giving colours very similar to veratria, while jervine and pseudo jervine give a yellow changing to yellow brown, and after a time to green, the green tint becoming more developed on dilution

Colchicum autumnale, or Meadow Saffron -The whole of this plant. a native of Europe, is poisonous owing to the presence of colchicine, a mitrogenous substance classed by some chemists as an alkaloid. The corm and seeds are used in medicine chiefly in the treatment of goutand are a constituent of quack remedies for gout In over-doses, colcheum causes burning pain in the throat and abdomen, violent vomiting and purging, and the usual symptoms of irritant poisoning, coupled with great collapse. The brain as a rule, is unaffected intal cases death usually occurs within themty four hours. Post mortem appearances -After death the stomach and intestines are usually found inflamed, though this may be absent. In exceptional cases, however, post mortem appearances of irritation of the alimentary canal have been altogether absent Colchicum is seldom used criminally as a poison Dose -The medicinal dose of the powdered corm is 2 to 8 grains. The BP and IP in addition contain an extract, and an acctic extract of the corm dose 1 to 2 grains, also a wine prepared from the corm Istrength 1 to 5), and a tincture of the seeds (strength 1 to 8), dose of either 10 to 30 minims. In two cases a quantity of tincture equal to 48 grains of the dried corm caused death smallest fatal dose on record. More than one case of recovery after swallowing one ounce of the wine has been reported Treatment.-The general treatment of mutant possoning, with free administration of decoctions containing tannin. Stimulants in form of brandy by the mouth (or if vomiting is present ether injections) should be given to counteract depression, and the patient kept warm Detection -The fresh corm is pear shaped, about 2 mches long by 1 mch or rather more in width, brown externally, white, firm, and starchy within I hen cut it exudes a nulky purce, its taste is bitter and acrid. The seeds are reddish brown externally, white within, spherical, and about one tenth

of an inch in diameter. For the separation of colchicine from originic mixtures, Stas' process may be employed, using chloroform as a solvent Colchicine differs from alkaloids, in being removed from acidulated watery solution by agitation with chloroform, hence the acid watery filtrate obtained in Stas' process may first be shaken with petroleum ether, in which colchicine is insoluble, to remove impurities, and then without neutralization with chloroform Colchicine, unlike alkaloids also, is not precipitated by mercuric potassic iodide solution. The special chemical test for colchicipe is Zeisels, when a dilute solution of colchicine is boiled with ferric chloride it becomes green, sometimes dark green and cloudy, and if the fluid be then agitated with chloroform the chloroform will sink, taking with it the colouring matter and appearing brownish granite red or dark, while the supernatant fluid clears up without becoming wholly colourless. A readier test is the reddish violet colour produced by the action of strong nitric acid upon it It does not like veratria excite sneezing The physiological test is not trustworthy for colchicine, a French committee of experts concluded that "experiments on animals do not afford the means of determining that poisoning by colchieme has taken place. Ogier obtained the reactions of colchicine isolated by the usual process from the exhumed bodies of dogs which he had poisoned with it five and a half months before In the bodies of animals porsoned with it, Obolonski detected colchicine four and a half months after death 1

Hermodactyl, Surnyan—Under the name of arrangan two kinds of hermodactyl are sold in the baraars of India surnyan-shftrin or taste less hermodactyl are come more or less resembling colchicum corms. Of the two the tasteless variety appears to be nearly increased while the butter variety acts his colchicum, though doubtfully posnorus. It is the corm of Colchicum luteum, growing in Cashmere, and the sweet variety, the corm of Merendera persea. Dymock\* notes that the sheed bulb of the true narcissus (M. Tazetta) is sold in Bombay as bitter Surnjan, but that it may be detected by its larger size and timested structure. Its action is similar to that of other species of narcissus (see Amaryllidees).

## Leguminosa

There are soveral poisonous peas in India (Laburnum) Cytisus Laburnum—All parts of this plant, common in Europe, are poisonous Several cases of poisoning by it, mostly accidental, have occurred in England The usual aymptoms of laburnum poisoning are vointing and purging followed by drowsiness and insensibility, with muscular utuckings and dilated pupils. Its active principle is the alkaloid cytisine. Cytisine is said to be the active constituent of Persian and Australian insect powder Broom—Cytisus scoparium ved Sparitum scoparium—The tops of this plant also a native of Europe, are official in the BP and IP. In large doses they cause vointing and purging They contain a crystalline non poisonous substance, scoparin, and the poisonous highur volatile alkaloid sparteine, the action of which is identical with that of coins, a similar alkaloid contained in conium maculatum, which see

Dixon Mann, For Med., 619

<sup>2</sup> Mat Med , p 837

## Other Irritant Alkaloids.

Emetine.—This is the alkaloidal active principle of pecacianha, and is an irritant to the gastric mucous membrane, rapidly causing vomiting, it is also a cardiac depressant Apomorphine.—This is an artificial alkaloid, prepared by heating morphine with hydrochloric each. It is the most active emetic known, one tenth to one quarter of a grain of the hydrochloride of apomorphine by the mouth or one-twentich grain to one tenth grain hypoderimically injected, rapidly causes free vomiting, and may be employed to excite vomiting in cases of poisoning, especially where the rullet is obstructed.

In cases of poseoning by the alkaloidal irritants (and by alkaloids generally) administration is indicated of gallie acid, or tannia or decoctions containing tannin These form in-soluble compounds with alkaloids for animal charcoal, which removes alkaloids from solution by adhesion, may be given

with a similar object

## Non-Alkaloidal Vegetable Irritants.

The great majority of these do not contain any substance capable of detection by chemical processes. Hence, many can only be recognized by their botunical or physical characters A few, however, contain matters separable from organic mixtures by chemical processes and capable of identification by chemical or physiological tests. When such matter is a glucoude or other crystalline substance, its separation may in many cases, be effected by a modification of the process for elimination of alkaloid just described. This essentivity consists in extracting with immiscible solvents, eg. ether, benzene etc the unneutralized instead of the neutralized acid watery filtrate (see 'Pictotoxin' and 'Plumbagin').

### Anacardiacea

Marking-muts, Bhela, Bhelana (Hind), Bibba (Bomb) Sherankoltas (Tam.), the Irant of the Senacearpus Anataritium Marking muts appear to be seldom if ever, in India, given internally as a poison the bruised nut, however, is used as a local uritinit application for the purpose of procuring abortion, and the juice, like vitriol in England, is thrown over the body to cause mjury. A case of this last kind

terminating fatally, where marking-nut juice mixed with other irritants was employed, is recorded 1 Again, in a case tried before the High Court, Bombry, a Hindoo was convicted of crusing hart to his wife by throwing marking-nut juice over her face, blustering of the skin and sovere ophthalmic of one or, listing several days, being the result. Marking-nut juice is also used by mailingerers for the purpose of producing ophthalmic and skin cruptions, and Dr W Gray once met with a case where a man introduced three marking-nuts into his wife's vagina, appriently as a punishment for infidelity.





Fig 81 -Marking nuts

The juice, more or less diluted, is said to be used as an application to the skin for the purpose of imitating bruises in support of a filse charge  $^2$ 

IDENTIFICATION - Marking nuts, in the dry condition in which they are usually met with, are black in colour and more or less heart shaped, with a rough projection at the base (see Fig 81) They measure, ex cluding this projection, in longest diameter from about 7 to 11 tenths of an inch, and weigh from about 25 to 55 grains each. They have a thick cellular pericarp, the cells of which contain the irritant fuice. Inside the pericarp is a large flat non acrid kernel. An acrid junce similar to that found in the pericarp is contained in the thick roof bark of the tree. The acrid junce is soluble in alcohol, ether, and oils. It contains anacardic acid and cardol Although both these substances are readily decomposed by heat, irritant effects have been produced by exposure to the vapour of the ruice. Anacardic acid may be extracted from the ruice as an insoluble lead salt, by digesting an alcoholic solution with oxide of lead. Water added to the alcoholic solution after removal of the anacardic acid, causes separation of the cardol Cardol is a yellow, only liquid, insoluble in water, but soluble in alcohol and ether It blisters the skin strongly, and, according to Basiner, when subcutaneously injected in large doses, causes in warm blooded animals, stupor and paralysis. Marking nut juice may be recognized by (1) its solubility in alcohol, ether, and oils, (2) its vesicating action on the skin, and (8) if a few drops of an alcoholic

Basiner, quoted by Dymock, Mat Med, 2nd ed, p 204 Op cit, p 203

solution of the purce are placed in a porcelain dish, and a drop of solution of notassic hydrate is added thereto a bright green colour is at once produced, which on rolling the fluid about in the dish rapilly changes produced, which or forming the man about in the disk rap by changes to red lish brown. When applied to the skin it should be diluted with oil and used with caution. When applied diluted it may be some time before it begins to act. Testing in this way some of the fluid used in the Bombry case mentioned above no effect was noticed for forty eight hours after which a painful and very registent eruntion was produced

The fruits when bruised yield a brown highly acrid, oily Huice turning black on exposure to the air This juice when applied to the skin vestcates strongly raising black blisters containing a finid which causes an eczematous eruption on any part of the skin it comes into contact with. Internally adminis tered, the juice appears to be much less activaly irritant than it is when externally applied According to Dymock the juice of one nut mixed with a seer of milk is an ordinary internally administered dose in native medical practice, and Mohammedan writers speak of 12 to 24 grains of the juice, given in oil or melted butter as an ordinary medicinal dose, and of 2 dirhems (= 96 grains) as a poisonous dose

Cashew-nuts, Kapu (Hund Mar Bomb) Kottan munders (Tam ) High badam (Beng ), the fruit of Anacar dium occidentale -The pericarp of the Cashew nut contains a brown acrid nuce of similar composition and properties to marking nut puce Its alcoholic solution however treated with potassic hydrate solution, turns reddish brown and not bright green like an alcoholic solution of marking nut juice Cashew nut juice appears to be seldom if ever used criminally in India The Lernel of the nut is non acrid and is eaten raw, or more usually slightly roasted or cooked

Rhus .- Some species of this genus of Anacardiacem yield a milky juice possessing irritant | roperties very similar to those of marking nut juice Exposure simply to the vapour of this juice is said to cause dis jurce augment simply to me apour or this jurce is said to cause dis-tressing a propions. Woodman and Taly inent on a poisonous. Hims radicans poison oak or poison my Rius vernur poison humach, and Rhus toxico lendron Among the plants of bind Murcay mentions as yielding a similar sorth quice. Thus acus mada tays. Rhus succeda on Inn ) Tatree (Hind.) Arkhol rikul (Pavi) Pegarding R Toxicoden dron and otler species see -J C White s Dermatitis Ver enat t, 1897 (the American journals frequently contain reports on cases) Morrow s Drug Leuptions (Syd Soc Ed.) Albert Billet on Dermatitis from Vortugh, Summaly in humanita Soldiers (extended, 2nd, Louis, Donnal. November 18th 1896 p 458) McCartney (The China Me I Vissy Journ, vol vul %0 2, June 1694) also Mathews in September number Nicholson of New Royal Gardens has known several cases beveral

Dymock op cit, p 203 and I id Med Gar Aug. 1900
For Med p 282.
Plants of Sind p. 86.

MADAR 555

species give rise to acute inflammation of the skin, the so-called dermatitis venenata. The itching and burning and inflammation may be allowated by saturated solution of boric acid or sedamics.

#### Oleacea

Wild olives possess an irritant principle which has proved to be poisonous

Case —Wild clive poisoning —The Civil Medical Officer of Kurseong sent some wild olives preserved in line pince, which a Eurasian boy, fifteen years old belonging to the Victoria School at Kurseong ate on the 15th November. The boy was taken ill on the 16th with acute vomiting and died on the 17th. Other boys were reported to have eaten the same olives without ill effects. The clives were found to possess irritant properties. A small quantity of the extract of the olives were administered to a cat. The animal vointed several times, but ultimately recovered. The nature of the irritant principle could not be determined.—C. L. Bose Beng Ch. Ex. Pept., 1907.

## Asclepaadca

Madar — Calotropus gugantra Brown (vel Asclepus gugantra, Wildl), C procera Brown (C Hamiltons, Wight), Al., Madar (Hund) Akanda (Beng), Alra, Rus (Bomb) Erukku, Ernkam (Tam) These two shrubs closely resemble one another, and are known by the same vernacular names One or other of them is found growing wild almost everywhere in India The leaves and striks when incised, jedd an acrid milky junce, used in native medicine as an external application in cutaneous affections and as a deplitory The fresh or fired junce, or the root bark, is also given internally as an alterative or purgative. An ordinary medicinal dose of the powdered root bark as an alterative 13 to 10 grains three times a day. In doses of 30 to 60 grains the root bark acts as an emetic, and has been used as a substitute for ipecacuanha

In India madar juice appears to be used criminally, chiefly for suicide and still more rirely for suicide and still more rirely for suicide and still more rirely for homeide. According to Chevers and others, forcing madar juice down the throat is the method of infantioide employed by the castes among which female infantioide prevails. Madar juice is also given internally, and applied locally, for the purpose of causing abortion. The leaves have also been administered for criminal purposes with food. It is also used as a cattle poison.

The active principle appears 1 to be a yellow bitter resin, besides which the roof-bark also contains two substances named

Warden and Waddell in Pharm Journ, August 22, 1835

by Warden and Waddell, 'madar-alban' and 'madar fluavil,' closely resembling the alban and fluavil found in gutta percha It contains no alkaloid

Cases—As Infant Poson.—The Civil Surgeon Ludhiana, forwarded the weem of a female infant, aged 3 days, and to have been poisoned by the mother, after a quarrel with her mother in law The Junco of mad iv (Calotropus symmes) and optimi were found in the chill a stomach.—Vaj Black Panyab Chem Tz. Rpt., 1916 See also Case at 7, 251



Pig 3º -Calotropis gigantea-5tem Leaf and Flower !

Care —Catile Possening by madar — In 1896 a piece of cloth, stiffined with a study arbitance alleg 4 to be me lår jurce and taken from the stomach of a cow, was sent for eramination. In alcoholn extract of the rag was given to a cat which first within half an hour. The symptoms nonlocal were —Vorming profuse sativation severe tetanic convolutions, extremely also and stertorous breathing and dilation of the pupils — La AW add [1]. Borg Chem F z Rept., 1887

<sup>1</sup> Warden and Waddell in Plarm Journ , August 22 1885

Identification—The root bark (officinal I addn. to BP) occurs in short, flat or nethed pieces ½th to 4th of an inch thick. The outer surface is yellowish grey, soft and corky, fissured lengthwise, and can be easily separated from the middle cortical layer, which is white, mealy, and traversed by narrow brown liker rays. The taste is mucliagnous, bitter and acrid, and the odour peculiar (Dymock). Tigs 32 and 33 show the general appearance of the root, leaves, flowers, etc. of G gigantea Drury describes the flowers of C gigantea as rose colour and purple mixed, and those of C procera as rale purple.

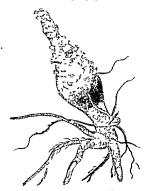


FIG 33 —Calotropis gigantea—Root 1

Cryptostegia grandiflora, Syn Acrium grandiflorum (see Fig 34) — The stalk is a climbing plant belonging to the NO Ascl.prader The stalk yields a milky juice, which, when dired, solidifies into a substance resembling india rubber One fatal case of poisoning by this plant has been reported as follows —

Case —Possoning by Nerum grandiflora —The pounded leaves inized with water were swallowed Persisting vointing came on half an hour afterwards, and the patient—a male adult—died in fifteen hours apparently from exhaustion There was no purging, and no head symptoms were present. No alkaloid could be found in the leaves

Tylophora fasciculata, vern Bhui dori (see Fig 35)—This plant is abundant in the Southern Konkan, where it is used as a rat poison One homicidal case of poisoning by administration of the pounded roots in

food has been reported (see below) Trom the symptoms stated to have been present in this case, viz tingling in the mouth dryness of the threat giddness, loss of power over the extremities, and insensibility with dilated pupils, the poison appears to be narcotico irritant in its action

Case —Tylophora fascculata poseoning—Asst Surgeon Narayen Annana, in charge of Pandianpur dispensary reported in April, 1890, the following case: A Volnammedan family, consisting of six adults and a servant boy of a flowt fourtheren, were attacked soon after a meal with symptoms of poseoning. The servant boy died in about two hours. The others were seen the next morning when they complianted of dryness of the threat, great thirst, and a feeling of soroness over the whole body. Their pupils were distard, and pulse full and slow. They stated



Fig. 34 —Nerium grandiflorum rei Cryptostegia grandiflora

that soon after taking their mid-day meal on the previous day they let some singing sensition in the mouth followed by dryness of the tongue and throat and guidaness, and loss of power over the extremities. After this they became invensible. Three of them romitted and recovered consciousness at about 8 rs the other three remained incensible tail midnight. On post mories examination of the body of the bory, the following appearances were noted—Face bloated tengue and eye sightly protrong, evens of the neck turned. Lungs engaged, right rade of the heart further many. blight congection of the parameter of the second of the seco

was reported obtained some bhui dorce roots, and having reduced them to powder mixed this with some flour from which subsequently the food exten at the meal referred to was prepared

Tylophora asthmatica Wright and Arnott Antamul Jangle pike in— This plant used as an emetic in India caused three fatal cases of poison ing in Madras in 1898 (see Case below) An alkaloid named tylophorine was extracted by Dr. Yan Gezel



F10 35 — Tylophora fasciculata

Case —A young man suffering from gonorthes took the junce of this plant about 10 × y and died next moning, with slight carvations of upper extremities and unconsciousness. A man and his wife were given this plant by a native quick doctor also as a cure for gonorthea. At 7× y three hours after, both complained of acrid feeling, in mouth and throat followed by naises ormiting purging collipse and death next day. In both cases the alkaloid tylophorine was extracted from the viscers. The accused native doctor was sentenced to 18 months rigorous imprisonment. His defence was that three days doces had been taken all at once —Mad Ohem Ex. Refr. 1898

### Convolt ulacæ

Kala-dana seeds — Kála dánah, Mirchai (Hind, Beng, and Bomli), kodi hallatan virai (Tam), the seeds of Ij omaa he leracea v carulia These are used in India as a substitute for jalap, the medicinal dose being 30 to 50 grains of the powdered seeds. The active principle is a resin considered by Fluckiger and Hanbury to be identical with convolvibin No case of poisoning by these seeds has been reported, but in large doses the powdered seeds would doubtless give rise to symptoms of irritant polsoning IDENTIFICATION -Dymock gives the following description of the seeds "The seeds resemble in shape those of most of the convolvule. being in the form of a segment of a sphere, they are generally about y's of an inch in length and nearly as much in breadth but sometimes much smaller Their weight varies from 1 to nearly I grain, the colour of the testa is black except at the umbilious where it is brown. Upon sonking the seeds in water the tests bursts and discloses the delicate albumen which envelops the folded cotyledons and radicle. These have an acrid taste and carthy odour The same author notices that in Bombay the seeds of It omora muricata are more common than those of the true kaladana These are similar in action and appearance to true kula dana seeds. except that they are larger and heavier, weighing about 3 grains each, and are rather lighter in colour

#### Cueurbstacen

Elsterum—This is the sediment from the expressed june of the Lebalum claterum (sym E optenarium) or squrting eucumber I is a powarful cathartic, and is used in incidence as a purgative in dozes of one sattenth to half a gain One grain has caused severe symptoms, and probably but little more would be required to cause death. The netive principle is elaterin, a white crystalline substance obtainable by adding ether to a chloroform solution of elaterium, elaterin is soluble in alcohol and not precipitated from its alcoholic solution by tannul. Dymack notices that the fruit of this plant or of a closely allied species, is sold in the Bombay shops under the name of Katerundrayan, Tiex-trizic trio.—The fruit is 1½ to 2½ inches long oblong covid, pale yillowsh green and covered with numerous short fleshy profiche it immating in white elongated points. When ripe it separates suddenly from the stalk, violently expelling the june and seeds.

Carcuta reflexa, Manacia, Ghagarbel (see Fig 36)—This is a prassite plant with white bell shaped floorers, common no bushes in some parts of Indea According to Asst Surgin Dulip Singh <sup>3</sup> the dhats (nurses) in the Panjub have great faith in a decoction of this plant as as abortinement. A decoction of 180 grains of the plant made with boiling water, suffices, it is stated to produce depression with nausea and voint ing, followed by shortion.

Citrillos colosynthis—Indrayan (Hind) Peylomatis Tunnet (Tain.), Kururundanan (Mar)—The colosynth of the pharmacopuras, used in medicine as a purgative in doses of from 2 to 8 grains is the dired and powdered fruit pulp of this plant. In large doses it acts as an irritian poison and has in Europe in several instances caused death. Christops' mentions a case where a texponontial and a latif of the product fabout 20

Pharmacographia, p 262 Ind Mel Gas, January 1885

<sup>\*</sup> Mat Med , p 852 \* Poisons, p 595

grams) proved fatal and Taylor 1 cites the case of an adult female who took 120 grams of the powder in order to cause abortion, and duct in fitty hours A case of recovery from a dose of 3 owness is, however, reported The active principles is a glucoside colocynthin. In India both the fruit pulp and the root are used in nature mechaneas purgatives. INTIFICATION—The drief fruit of Indian colocynth is yellow brown in colour, and about the size and shape of an orange. It contains a scanity greyish white pulp, in which are a number of brown seeds? "The root is fibrous, tough, and stringy, and of a yellowish white colour. All parts of the plant are very bitter and the dust when dry very irritating to the evers and notrals." (Drinock)



Fig 36 -- Cuscuta reflexa

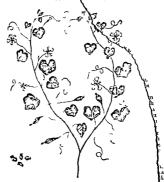
Other Cacarbitacese—Many other plants of this order possess proptes more or less resembling those of the three just mentioned Some, it, is true, yield edible fruits, but 't there is reason to believe that some if ne's all the edible sorts of gourds owe their freedom from poissonous properties to cultivation, for some in a wild state are found to possess them in much activity. The principal Indian species mentioned by different writers as being either in common use as purgatives, or as having given

Poisons, p 522

i These are of flattened ovoid form, measure two tenths by three tenths of an inch, and are disposed in vertical rows on three thick parietal placentic, which project to the centre of the fruit, then divide and turn back, forming two branches directed towards one another (Dymock, p 337)

<sup>:</sup> Lindley, quoted by Birdwood, Bo Veg Prod , p 157

nus do case of possoning are as folkins:—The bottle gourd Lagrariar evidgaria.—Thub Karrei, tumbe Kurei, tumb



Pio 37 —Momordica cymbalaria.

is said to posces properties annite to those of the officinal colors, if Centums Inpunit (sin C. prade colorprite) Kerné (Dronch, if Argur Hailandhi (than of Ind)—Tha has bitter finit of the size a hape of a small egg. The first is use it as a substitute for colorprit In 1882 a case was reported to the Bombay Chemical Analyzer's Office on which it was stated that the roots of this plant had been administer for the purpose of procuring abortion. A writely, C triginus, producerae, Zadanda, is much has bitter and is used as a yecular color of the purpose of procuring abortion.

Lindley, quoted by Birdwood Bo Veg Prod p 157
Murray & Plants of Sund, p 41

Trachosanthes dioca, Pulbul, Potole—K L Dey¹ states with reference to this plant "The bulbons part of the root is a hydragogue cathartic". This plant is cultivated in Bengal and Guzerat for its fruit, which is used as an article of fool. An alcohole extract of the unripe fruit in three to five grain doses is described as a powerful extractic. Teucumerina, Kādu pa latala or Ranpadarala (Var) has similir medicinal properties and is the Patola of Bombry, it is not cultivated and the fruit is never eaten. Similar properties appear also to be possessed by T palmata Lal in Irayan (Ilind). Kaun Iad (Bomb), Mākal (Beng). Koratti, Shawaripathan (Tam.) the fruit of which Dr. kirtikar informs me, is sometimes used as a cettle poison.



Fig 38 -Momordica charantia

Momordica cymbalara (syn Lutja luberous) Kadatarachi (Mar) [see Irg 37)—Dyrook in regard to this writes: "The whole plant is send The furth is about 1 meh by 1½ meh has eight prominent ribs is covered with sliky hairs and while still green dehises into four parts discharging its seeds. The roots are tuberous and onoid. Three cases in the last few years have been reported to the Bombay Chem Analyzer, in which it was stated that abortion had been caused by the administration of a decoction of these roots.

Momordica charantia Karela (Hind) Karla (Bomb), Pava kai (Tam), (see Fig 88) —The fruit of this is bitter, but wholesome It is

<sup>1</sup> Drugs of India, p 11c

eaten, but requires to be steeped in salt water before being cooked. A case was reported to me in 1878, in which it was stated that swallowing a decoction of the roots of this plant caused abortion at the seventh month.

Luffa acutangula, var amara, Karvi-furat (Hind), Kadu sirola, Kadu dorka (Bomb), f.hoska lata (Beng), Sendubir kai (Tel) --Dymock describes the fruit as smooth, 3 nches to 5 inches long ovoid, marked with ten prominent sharp longitudinal ridges, and having at the spex a



Fig 39 —Luffa echinata.

small operculum rather more than 1 inch in diameter which is deckloous. The seeds are grey, and marked with small irregular, black prominent specks. Sakharam Arjun 3 describes the fruit as violently cathartic and emetic.

Modecca palmata.—In Madras a gurl ate some of the fruit of this gourd, and was attacked by severe irritant symptoms and died a week after 3

Luffa echmata, Kukar wel, Decdangra (see Fig 89) -- The fruit of this

<sup>1</sup> Bo Chem Analyser's Rept 1679-80 
<sup>2</sup> Bo Drugs, p 59
<sup>3</sup> Trans Bo Med and Phys Soc. 1887

is described by Dymoch as "oval, about the size of a nitimeg, armed with numerous long rather soft diverging bristles, obscurely divided into three cells, by numerous dry fibres, and opening at the top with a per forated stopple, which falls off when the seeds are ripe Seeds about eighten (ovale, compressed, black and scabrous) testa very hard Kernal white

The fruit of this is also stated by Sakharam Artun to possess purgative properties !

### Euphorbicea

The Euphorbias all yield an acrid milky juice possessing properties similar to those possessed by the juice of E resimifera,



F16 40—Euphorbia rothiana

and probably also possessing the same chemical composition <sup>2</sup> Various writers mention the following Indian species as plants the juice of which is employed in native practice, externally as caustic or vesicant, or internally as a purge Occasionally,

Mad Chem Ex Rept , 1898, and Dr Warden Pharm Jour 1890 p 997
 Fluckiger has also found euphorbon in E Trucalls and E cathinaudoo

also, the juice of one of the euphorbias, or a twig of one of them, is used as a local irritant application for the purpose of crusing abortion, or homicide is attempted by mixing the juice with food

Euphorhum, or 'down Luphorhum vern Tarfyun, is the dired mulky juice obtained by incising the floshy branches of I\*raphorhum remained by incising the floshy branches of I\*raphorhum remained in the same of the s



Pig 41 - Corollacarpus epigma

properties to an amorphous neutral resun readily soluble in cold spirits of wise Of this 38 per cent was present in the sample examined. In addition the sample contained 22 per cent of cuphorhom, a crystalline substance, sparngly soluble in cold but freely soluble in boiling alcohol, and soluble also in either. The remaining 40 per cent was im a bup of mucliage, malates and interest compounds. If euphorhom, deposited from solution in sleohol in a thin film is movitened with oil of vitrol, and strong inter acid be slewly added by means of a glass red, a fine

Christison, Passons, p 589

violet hue appears. Lactucerin, contained in Lactucarium, gives, however the same reaction

Euphorbia tirucalli, Milk hedge Thor meal (Bomb), Kali (Tam), Tirucalli (Mal), Lunhasy (Beng)—Dymock meutions that one to four drops of the juice of this are given as a purge

Euphorbia neriifolia, Schund Thohar (Hind), Mansasi, (Beng), Newarang, Mingus (Bo) Itaik kalli (Tam) —Ainslie, quoted by Dymock, states that the usual dose of the juice of this plant, given by native practitioners as a purge, is about twenty grains

Euphorba antiquorum, Schadula call. (Mal), Shadray Kullic (Tam), Bontquamnodoo (Tel) Anarahy Seyard (Ilmid), Anary (Beng), (Ilory)—Dymock also mentions F pilulifera, E thymifolia, and D parvyflora all three known in the Southern Concan under the name of Nayeti Tourry refers to the use as a vesicant of the fresh junce of D cattimandoo and W Gray' mentions a case in which the junce of D rothiana (see Fig. 40) was administered internally to a sick man who shortly after wards died, but whether from the discase or the effects of the medicane, could not be made out from the particulars furnished of the case

Corollacarpus epigaca (syn Bryonia epigac) Rakangaddah, Akas gaddah (Hind) Karu: nai (Bo), Akasha garudan (Tam) (see 11g 41)
—The root of this plant contains a yellow bitter principle which Dymock suggests may possibly prove to be identical with bryonin The root is used in doses of about one drachin in twenty four hours as a purgative

Croton seeds and oil—Croton Tiglum—Janadgota (Hind, and Bomb), Jaipal (Beng), Nevalam (Tam), Nappalum (Tel), Caddanancu, Neeraula (Mal)—Both the seeds of this plant, and the oil expressed therefrom—croton oil—are highly poisonous. The oil is used in medicine as a purgative in doses of one-third of a minim to one minim, Applied to the skin, it vesicites. The Limimentum crotons BP, used as a counter-irritant external application, consists of one volume of croton oil to seven volumes of a mixture of equil parts of equiput oil and rectified spirit. Three drops of the oil proved itail to a child one year old, and half a drachim has caused death in an adult I none case an adult Line in four hours from a dose of 2½ drachims. One or two grains of the seeds, when swallowed, suffice to cause severe pain, with copious watery stools. A case also is reported in which severe symptoms (pain and collapse but no purging) appear to have been produced by inhaling the dust raised in emptying packages of the seeds.

The poisoned arrows of the Abor tribe of Assam were found to contain croton oil (Maj Windsor, I M G Jan. 1912), and derived from a piste of the pounded plant, and not the seeds

Pharmacographia p 504 Suit Med p 604
Useful Plants p 204 Bo Chem Analyser's Rept 1874-75

Kobert from recent researches attributes the activity of croton oil to croton oleic acid (distinct from crotonic acid) present in the oil, both free and as a glyceride Besides this croton oil also contains the glyceride of a peculiar acid—tighic

or tiglime acid-isomeric with angelic acid C5H8O4

IDENTIFICATION—The seeds are oval more arched on the derval than on the ventral surface about half an inch long by nearly two fifths of an inch broad and weigh about four gruns each. The testa is black thin and brittle and more or less covered by a thin cinnamon brown coat. The kernel is white, is enclosed in a delicate white membrano and easily splits into two halves between which he two foliaceous cotyledons and a short thick radicle. The oil may be extracted from the seeds or or other matters by exhaustion with either and recognized by its vestcating action on the slin. The seeds of the following are stated to resemble those of croton tightum in appearance and properties. Ball spormum monitanum vern Danti These, Dymock states are often sold as Jam ilgoto by druggists, and Croton oblongifalium Baragach (Beng) Ganasur (Bo) Gonsurona (Goa)

In croton poisoning pain is felt at the back of the throat, which comes on some time after the poison has been swallowed;

and it is immediately relieved by a dose of bismuth

Cute—Cretes on possening homiculal (attempt)—In a boarling school of Patia na 11590 a boy servant was beaten by the cook and complained to his mother who remonstrated with the cook, but obtaining no astifaction she threatened to have her sverage. The cook as usual prepared the evening meal which was partaken of by four or five boys 4 short time after they all exhibited symptoms of urrainst posoning attended with frequent vom ting looseness of bowels and pair in the abdomen. The medical man who was called in treated the cases as crotin oil poisoning. Some vomited matter and cooked food (nee and tegetable) were sent for examination and crotion oil was detected in them. A matulty of curry powder was also forwarded but it was found to contain no poison. The boys all recovered. It was suspected that the woman had mixed powdered crotion seeds with the cooked food in the kitchen during the cook as absence crotion seed is being readily obtainable from any beautys a shop in the bazaar —L. A Waddell Beng Clein Px. Rept. \$1500

Castor-oil seeds and oil—Ricauss communis—Arands (Ilo) Prends (Bo) Bheroula (Beng) Amands-kens check Sittamizad I alluk (Tam.) Ottavanad oo Atanak Prandasanak (Idl) Sittamizad Amudum (Idl)—Castor oil of expressed from the peeled and winnowed seeds without the aid of heat is mildly purgratise. The seeds, however, are highly poisonous I france grains of the seeds have caused alarming symptoms and a case is reported where three seeds proved first to an adult in

forty srx hours. Fatal cases of poisoning by castor oil seeds administered in food have been reported. The poisonous principle of the seeds is an albumenoid body (right) a 'tox-albumen' resembling the active principle of abrus seeds (which see), which gives rise to volent inflammation of the alimentary canal, but not to catharsis, and ten seeds contain about one-tenth of a grain of ricin, or sufficient to cause death in an adult.\[^1\] Divitional Divition of cases and the resemble crook influence seeds in shape and internal structure, but are somewhat smaller The tests also differs in colour, being grey marked with brown blotches. The oil is distinguished from other fixed oils by being soluble in glacaal acetic acid and in alcohol. It is completely soluble in four volumes of spirits of wine at 15° C. There is





F10 42 —Physic nuts (Jatropha multifida)

also a large variety of castor seed, of a reddish colour with brown blotches, the oil obtained from which is much used for industrial purposes

Physic Nuts.—Introphae curcas —Jangla arenda (Hind), Bagbheranda (Beng), Moghit crenda (Be) Kattamanakku (Tum), Galamark. (Gon) —The fruit of this and of the other jatrophas named below (physic nuts) contain oil; poisonous seeds. The action of these seems to be similar to that of croten tiglium seeds, but somewhat milder in degree. The oil expressed from the seeds irritates the skin and given internally, in doses of twelve to fifteen drops is powerfully purgative. Severe vomiting and purging have been caused by swallowing a few grains of the cake left after expression of the oil from the seeds beveral cases of accidental poisoning by physic nuts are recorded, and Chevers mentions one where in addition to the usual irritant symptoms, muscular twitchings, deafness, impairment of sight, and loss of memory were present. The fruits of J multifida and of J glandulifera, Undarbibi, Jangle crends

<sup>1</sup> Stillmark Drop Arb , 111 1889



Pio 43 - Jatropha Leaves (1 cureas 2 glandulifera 3, multifida)



(Bo), Lalbherenda (Beng) Addaley (Tam), Nela-amida (Tcl), are quite as poissonous as those of Jeureas IDFNTHICUTION—The fruits of all are three-celled and three sceded J multifiad has fruit as large as a walnut of the shape shown in Tig 42. Those of Jeureas are of about the same size, but more uniformly oval in shape, and those of J glandulifera are not bigger than a hazel nut, oval, and marked externally with six deep longitudinal groves. The three plants also may be distinguished by the shape of their leaves (see Fig 43). The seeds of all three varieties in shape and internal structure closely resemble castor-oil seeds. Jeuceas seeds are about three quarters of an

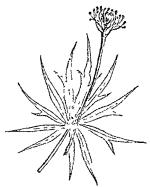


Fig 45 -- Jatropha multifida

nch long and rather less than half an inch broad J. multifida seeds are somewhat broader, and J glandultifera seeds are only three tenths of an inch long and two-tenths of an inch broad J curcus and J multifida seeds are black with a white scar at one end while J glandultifera seeds are grey with two brown stripes on the dorsum.

Other Euphorbiaceae.—The following other plants of this order are of medico legal interest .—

Manihot utilisauma (Jatropha manihot), the Cassava—This plant is cultivated in Southern India for food, the boiled root being a staple of diet. It is a native of the West Indies, where its strickly root is used as an article of food under the name of coasava. From the root also is prepared the 'tapica' of commerce after dissipating the poison by roasting. Two varieties of it exist—a sweet and a bitter variety. The latter abounds in a poisonous 'inlky juice containing hydrogianic acid, to which its toxic power is due. Owing to its volatility, however, this is entirely removed by heat, and hence bitter cassava root may be utilized as an article of food, after the juice has been squeezed out and the root has been cooked. Two fatal cases of poisoning by this root were reported from Vadras in 1898. one a child, and another several families?

Jatropha urens —This also is a native of the West Indies has leaves covered with stinging hairs merely touching which his it is and, in two instances caused serious symptoms. In one of the two reported cases extreme collapse came on in a few minutes. In the other "the pain and swelling in the part touched lasted for some dans." Hipp or ions Mancinella Mancined—This tree, also a native of the West indies wields an acrad mulky junc. which, applied to the skin, causes violent inflammation, and in the standard of the standar

Katlyum or Pasu—Cleusanthus collinus (Benth), Cluyta collina (Rosb) Lebide riopus orbicularis Vern 'New larg' The bark of this tree, which grows in Chota Nagopr, is used by the Kols for poisoning fish, like cocculus indicus, and also occasionally as a human poison and is said to cause vomiting and purging with eramps in the limba and death in a day or two, see C see below The rind of the cypsule is said by Robdurgh to be poisonous.

Case —Poisoning by Karla jurn.—Suncidal —In 1897, some reddish brown hash of a tree called "Karla jurn was sent for examination from bingblum, along with the viscers of a woman who was sent do have died from its effects brying been eaten by her in order to commit wouldo owing to a quarrel. She died two days after taking the posson "No poison was detected in the viscers of the decessed. But the alcohole extract of the bark, which was administered to a full grown eat produced the following symptoms — Yomiting, weakness in the extremites tremor of the head,

Mad Chem Fr Rept., 1899
 Med Jur. p 275
 Jkd Jur. p 255
 Jkd Jur. p 255

wided dilated pupils, extreme prostration, and death in five hours. The ethereal extract of the brd, was not poisonous. A portion of the plant was sent to the Dotame Gardens and identified as an *Emphorbaceous* species named Clessanthus collinus (Benth in Flora of British India) — L. A. Waddell, Beng Chen Ez. Rept. 1897

### Lalancear

Aloes.-Elwa (Hind and Beng), Elia, Piralabola, Kalabola (Bo) Kariya polam (Tam) -This well-known medicinal substance is the inspissated juice of the leaves of the Aloe sulgaris and other species of aloe It is a powerful drastic purgative. acting specially on the rectum. The usual medicinal dose is three to five grains In large doses aloes is an irritant poison, two drachms has caused death, and a case was recently reported to the Bombay Chemical Analyser's Office in which a man appears to have died from the effects of swallowing, as a purcative, a decoction of wild aloe leaves. Aloes has a oistimulant action on the uterus, and in Europe is frequently given or taken for the purpose of procuring abortion A form in which it has often been used for this purpose is hiera picra or holy bitter, a mixture of four parts aloes to one of canella bark Aloes also is an ingredient of Morrison's and most quack purgative pills. The active principle of Barbadoes aloes is barbaloin, a glucoside Other varieties contain natalion and socalion, bodies probably members, with barboloin, of a homologous series

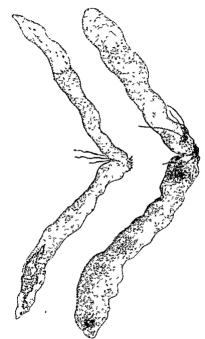
Squil.—Officinal squill is the sheed and daried bulb of Urginea Scilli (says Scilla maritima) In doses of six to fifteen grains it acts as an emette, and in larger doses as an irritant poson, causing comiting, prigring, graping pain, strangury, and bloodly urne I in posonous doses squill causes marked depression of the heart's action Convulsions also have been observed in positing by this drug! I wenty four grains of the powder has caused death. The active principle is scillitin, apparently a clucoside.

Giorcoa superba.—Langult, Karhara, Kulharı (Hind.), Bisha langult (Beng.), Indat, Negkara (Bo.), Kalappatkhahangu (Tam.)—The taberous root of this plant is populvely beheved in Indat to be highly poisonous. Burmese guis are said to commit suiced by its roots when crossed as love <sup>2</sup> Armording to Mindiu Shoraf, however, Alsand, tansanane in twelve grain doses, but acts as an alterative tonic and antiperiodic <sup>2</sup> In large doses it appears to be poisonous, acting in the same manner as squill (see Gazs below), and Warden isolated a lutter principle from the root, which he has named superbine, and considers to be closely allied to, in the deathead with, sculling. In principation —Dynock describes the

Christison Poisons p 214

<sup>\*</sup> But Mr Hunter, Chem Exmr, Rangoon, has only had about six such cases referred in eleven years

Dymock's Mat Med, p 633



Pig 45 -- Gloriosa superba. Poot (Natural size)

root (see Fig 46) as "tuberous, cylindrical, and flattened, often seven to eight inches long and about one inch in diameter, it consists of two tubers which unite at a right angle, one being much smaller than the other, at the point of union may be seen on the upper surface a circular sear marking the attachment of the stem, and on the under surface, immediately beneath it, another, to which is till of thin rootlets is often attached. The tubers are covered with a brown epidermis, except at the point, which is tapering and nearly white, like the growing part of a young kidney potato. Internally they are juicy, white, and farinaceous, and have a faint acrid door, the taste is muclaignous, feebly biter, and a little acrid." Gloriosa superba root is said to be used in India as an adulter and counter to a

Case—Poisoning by glorious superba—Dr Battacharjee, Int. Med. Gaz., 1872, p. 158. reports the following case—A female, at 18, swallowed a quantity of the powdered root. Symptoms of poisoning appeared in half an hour, and were retching, volent vomiting, spasms, and contortions of the body, with fearful racking pain, from time to time there were short intervals of relief, followed by recurrence of the same symptoms. Death took place in four hours. The post mortem appear ances were congestion of the brain and its membranes, with extravasations of blood. The lungs, liver, and kulneys were all deeply congested. The gastice mucous membrane showed signs of inflammation. The portioneal eovering of the fundus of the uterus (unimpregnated) was also found inflamed.

### Ranunculacea

The Hellebores.1-These, natives of Europe, are all highly poisonous The principal species are H niger, or Christmas rose, the melampodium of the old Pharmacopæras, H factulus, bears'-foot, fetter wort, or felon-grass, and H. viride 2 are compound irritants, causing violent vomiting and purging (the latter, however, has in some cases been absent), and great collapse. Convulsions and insensibility have also been observed. Two poisonous glucosides have been obtained from the hellebores, namely, helleborin and helleborein These, especially the latter, are powerful heart poisons. Black hellebore root, in doses of a few grains, acts as a drastic purgative, and thirty grains of an aqueous extract of the root has proved fatal to an adult The leaves of the hellebores are also poisonous, and a case is reported where a child, at 2, was killed by two dessertspoonfuls of an aqueous infusion of the leaves of H. viride, given as a vermifuge,

Anemone pulsatilla and other species of anemone, and Ranunculus acris or 'buttercup.' R sceleratus, and other species of ranunculus, contun an acrid oily matter, acting as a vesicant when applied to the skin, and when swallowed as a compound irritant poison, eausing, in addition to

<sup>&</sup>lt;sup>1</sup> The name "heliebore" is also applied to certain species of veratrum plants belonging to the NO Melanthacce <sup>2</sup> Murray a Plants of Sind, p 78

the usual symptoms of irritant poisoning, depression of the heart's action, is store respiration, panalysis, and convisions. The neard only matter may be separated from the plants by distillation with water, and the plants, on drying and exposure, after a time lose their activity. The acrid only matter on keeping decomposes into amenone and, apparally mert, and an amount, which is actively poisonous. Murray notices that R. scrievatus grows in Stand and the Panish, and is variethely poisonous.

Actaes racemosa (syn Cunterfuyar racemosa), Black rankeroot or black Cholesh—The rhizome and rootlets of this plant are officinal in the United States Pharmacopera. In large doses, st causes mauses and worst ing, and depresses the action of the heart In one case abortion is reported to have followed its administration. Adons scenatis, regarded by some as peoces of aucomose, must also be mentioned as a charge of the contract of

To this order also belong the alkaloi al Delphinium stanhusagria

and Aconstum napellus and A ferox, which are cerebro spinal and

### Thumelacen

Mezereon - Dapline merereon, and D laureola for Spurge-Laurel and other species of the same cenus, are compound frutant poisons few accidental fatal cases of poisoning by the bright red berries of D mezercon are recorded, the symptoms being vomiting and purging, followed by parcotism with dilated pupils. The bark also is poisonous, and appears to contain a latty vesicating oil Several members of this genus are found in India, and Burton Brown mentions that the root and stem of one species (apparently D papuracea), growing on the hills, is a powerful irritant known under the vernacular name of 'Gundhera,' and that it can be recognized by the peculiar woods tissue which forms the inner bark. and which is composed of long white fibres, easily separable from the wood. Lastopsiphon spectosus, vern. Rametha — The bark of this shrub, common on the Chauts is a powerful vesicant, and is used for poisoning Dr W Gray mentions a case in which administration of the leaves of the plant caused irritant symptoms, followed by abortion and death 2 Dymock describes the bark as acrid in taste and consisting "of an outer tuberous portion, which is of a light brown colour, and divided by numerous transverse and longitudinal fissures, so that it can be easily separated, and of an inner layer, which is white, tough, and silky like mezereon

#### Armden

The tuberous roots of many of the erums, a genus of this order, when taken into the mouth, cause immediate burning pain great swelling of the tongue, and salustion, and when swallowed gue tise to a timptons of irritant polsoning. The roots of many contain much starch, and are used, after washing and baking, as articles of food. The following may be specially mentioned—

Arum maculatum, 'lords and ladies,' cuckoo pint —This, common in Lugland, has given rise to several cases of accidental poisoning, chicity

\* Bo Analyser's Rept , 1874-75, p 10

On 'Poisons used in the Panjab,' quoted by Chevers, p 285.

among children, from eating the leaves. In some of the cases con vulsions and dilated pupils are reported to have been present tuberous root-poisonous when fresh-after steeping in water and baking, is used as an article of food under the name of Portland Sago-Arum segumum—dumb cane—A native of the West Indies Two drachms of the juice of this plant has been known to prove fatal in a few hours Arum montanum, Konda rakis (Tel ), and Arum luratum, Adai: -These are both, Drury states, natives of the mountainous parts of the Northern Circurs The root of the first is so poisonous that it is used to poison tigers, the root of the second is used as an article of food, but requires careful cooking Synantherias sylvatica (syn Arum sylvaticum), Uromut (Goa), Warmut (Mar ) - Dymock notices that the seeds of thus produce the local effects noted above, followed by numbness, and states that the crushed seeds are used in the 5 Concan, on account of their benumbing effect as a remedy in toothache. Arum colocasia (syn Colocasia antiquorum), vern Kachn or Bigh Kachn -It is used as an article of diet in India when roasted or boiled Two cases of poison ing by the tubers of this plant, both non fatal, were reported in Bengal, in 1886 (see below)

Case—Arum—Kachu pousoning—In a case Irom Dibrigarh in Assam, a sice coole had some fried Kachu administered to him and experiencing a burning sensation spat it out, whereon a pig ate what had been ejected and died in an hour, and a second pig was given some and also died Dr. Warden failed to extract from the tubers any active principle, but found them to contain bundles of needle shaped crystals of oxalate of lime, which would he thought, mechanically account for the irritant symptoms, but boiling destroys the poison of most Arums and has no effect on the ornals of lime

### Amaryllidea

Daffodil—Narcissus pseudo narcissus—This, common in Engluid is mentioned by Guy and others as an irritant poison. Other species of narcissus also have a similar action. The root of an Indian plant of this order namely. Crimim assaticium, vern toxicorium, is othenal in the Pharmacopies of India as an emetic, and Dymock mentions that the bulb of Crimim ornatium, Gadambikanda (Bo), is extremely acrid, and it is used for blastering cattle, a slace being bound on the slam.

### Other Orders

Argemone mexicans, N. O. Paparinacea, Bharbhand (Hind), Brahma dand (Sans) Shuld Manta (Bing), Dairun (Bo), Ferniny adurra or Pila datura (Duk).—The seeds of this plant yield an oil which, when swallowed, causes vomiting and purging In 1876 four cases of accidental poisoning in Bombay from the use of this oil in food, in evch of which several persons were affected, were reported. Inxvirious rational and in close several persons were affected, were reported. Inxvirious about one fifth of an inch in diameter, and covered with muthers region and a half inches as media in the control of t

similar reaction — Dragendorff has found the seeds to contain an alkaloid possessing react ons similar to those of morphia

Capsicum annuum or Chillies' NO Solanaceae, Lal mirch (Hind Bo and Beng ) Milagay (Tam ) - The fruits of this and of other species of capsicum contain an exceedingly acrid volatile non alkaloidal substance capsicin apparently the active principle, and also a volatile alkaloid, with an odour like coms Applied to the skin capsicum causes irrita tion and vesication, and taken internally in sufficient quantity. acts as an irritant poison. Owing to the volatility of the active principle the fumes arising from burning capsicum are highly irritant The medicinal dose is half a grain to one grain Woodman and Tidy mentioned a case where quack pills contain ing capsicum proved poisonous to a woman aged seventy four . and Taylor mentions a case where a quack was tried for causing the death of a boy aged fifteen who was suffering from hip joint disease by giving him a mixture containing Cavenne pepper the prisoner however was acquitted Capsi cum is frequently used in India for purposes of torture Chevers mentions its use for this purpose in the following ways -/Introduction into the nostrils eyes vaging or urethra burning it under the nose rubbing it on the breasts of females and covering the head with a bag which has contained it. IDENTIFICA TION -The appearance of the fruit is well known The seeds are of a flattened kidney shape about a quarter of an inch long and wide and closely resemble datura seeds Lake datura seeds the testa under the microscope is seen to be covered with convoluted ridges. They differ from datura seeds (1) in having a pungent taste, (2) the convex border is single not dout le as in the datura seed and (3) on section the emi ryo is seen to differ in shape from that of the datura seed (Figs 47 and 58)

Cocculus inducus, or Levant nut —The fruits or berries of the Anamurica cocculus N O Menupermacca, vern Kalamir (Hind) Kalphal Karin (Do) Kalkay kelli rirai (Tam)—These are highly posocous owing, their activity to the presence of paratoze n a crystallizable non alkaloudal principle contained in the needs but not in the pericary of the feuit. The pericary in fact is non poisonous and an entire berry might therefore possibly pass through if e body without causing bad symptoms Symptoms—Picrotoxin is an irritant poison causing vonting

Bentley and Redwood Mat Med ea p C25 Taylor Poisons p 505 gives the medic nai doso as five to ten grains.
 Possons p 505 (R v Stevens C C C May 1864)

purging, etc, with extreme giddiness, faintness, dimness of vision, followed by delirium and epileptiform convulsions,

stuper, and loss of voluntary power

A few cases of poisoning by cocculus indicus berries have occurred in Lurope and America. In one case a child died from the application of an alcoholic tincture of the berries to the head. A decection or extract of cocculus indicus has been used in England as an adulterant of beer, porter, etc., in order to increase its intoxicating power, and it is said to be largely used for the same purpose by the liquor retailers of Bombay. In England cocculus indicus has been used by theves to stupefy their victims in order to facilitate the commission of theft, and in 1881 a case was referred to the Bombay Analyser, in which it was alleged that it had been used for a similar purpose. The Bombay records also show that during the last ten years cocculus indicus was detected in three cases of alleged cattle poisoning. In India occulus indicus berries









Enlarged section

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Fig 47 -Cocculus indicus

are used as in England as a fish poison. In medicine occulus indicus is only used as an external application as a parasiticide (see also Spinal poisons') Tatal Period—Of six persons accidentally poisoned by decoction of the berries, two died within half an hour, the remaining four recovering after several hours' ISPAINICATION—The dry berries are nearly globular, about half an inch or rather less in diameter, and have a blackish wrinkled surface. On section they are seen to contain a peculiar mushroom shaped body, consisting of a cup-shaped seed supported on a stalk formed by a projection inwards of the endocarp (see Fig. 47). The percarp is tasteless, the seed is bitter. From organic mixtures picrotoxin may be separated by digesting the matter under examination with alcohol, evaporating the alcoholic tincture nearly to dryness, and treating the extract so

obtained with acidulated water The acid watery solution is then to be filtered, shaken with ether, and the latter separated 'Wharton and Stille Med Jur. 499

and evaporated to dryness when picrotoain if present will be found in the residue Picrotoxin is not precipitated from solution by the group tests for the alkalouts. It has a bitter taste, reduces alkaline copper solutions like grape sugar and dissolves in stron, sulphuric acid forming a yellow solution which on addition of a trace of potassium dichromate becomes violet, changing into brown.

Ergot —This is the sclerohum (compact mycelium) of Chargot purpurea a fungus parasitia within the piles of numerous plants of the order Grammacce Rye so affected constitutes the ergot of rye used in medicine Other cereals cg wheat and cats are hable to the affection ¹ In large single doses ergot causes the usual symptoms of irritant poisoning accompanied by headache giddiness and stupor depressed action of the heart and dilated pupils Acute poisoning by ergot is very rarely mef with Outbreaks of ergotism or chronic poisoning by ergot arising from the use of affected grain as food have occurred in I rance and Germany Lingoism shows itself in two forms—convolusive and guigemons form. Both commence with gastronitestinal disturbance In the first juddiness aberrations of vision loss of sensition in the hands' and feet sprsms and convulsions are the prominent symptoms. In the second dry gangrene of the extremities is the principal effect

Ligot causes contractions of the interim especially of the pregnant uterus and hence is used sometimes eriminally as an abortisect. In the early stages of pregnancy however it sometimes fails to excite contractions of the uterus. Thus Taylor mentions a case where a woman tool about a teaspoonful of tincture of ergot three times a day for else makes an I del at about the third month of preguancy without having abortel. The medicinal loss of powdered ergot in u-erine diseases is 6 to 15 grains three times a day but it sadiministration should not be continued for any length of time. The does for a woman in labour is 20 to 60 grains. Doese of 30 to 102 grains have caused symptomic of poison ing. IDENTIFICATION—Ergot appears to contain more than one active principle is now of which however possess deficience defancies sufficiently distinct to erable them to be recognized with certainty. Ergot of type consists of furdering grain one quarter of an inch to one and a half inch

Chevers mentions that ir India a ducase called kers appears in barley and cats and a similar disease called kindol appears in Bayri and points out that grain ti us affected resembles ergot of rye

Raylor s Man sol p 513

<sup>&</sup>lt;sup>2</sup> The latest recentless are those of Kohert according to this authority expot contains three active prince piecy viz (1) experimens at this practipaes the spinal cord but does not appear to act on the sterms (2) sphaeclinic acid his excuses spaxnodic contraction of the arteroless resulting in gangemen or extrawant ons of blood and (8) cornutin a convulsant causing clonic and tonic spanns.

in length, and about one strib to one third of an inch thick Externally the grains are deep purple, internally they are white or pinh. They have a peculiar fishy odour, which becomes more developed on the addition of potash. Ergots of other grains chiefly differ from ergot of rye in length and thickness.

Gamboge, Ussarah-1-Rev and, Gotaganba (Pers, Hind, and Bo) Mulk (Tam)—This is a gum resin from Gavenna morella, NO. Guttifere and is used in medicine in doses of one to five grains as a directive purgative. One drachm has caused death. A case, however, occurred in Bombay in which a girl, et 19, intending to commit suicide, swallowed three drachms, but recovered under treatment. Identification.—A tawny or brownish orange substance, generally met with in cylinders one to two and a half inches in diameter, with an acrid taste, forming a yellow emulsion with water, and violently purgative.

Monnga pterygosperma, the Horse radish tree, N O Morninger, Salyna (Rind), Shegra, Shegat (Bo), Murangar (Ham) —The fruit of this tree is eaten as a vegetable, and the root is used as a substitute for horse radish which it exactly resembles in taste R Lall Dey's strets that one of the methods of procuring abortion in use near Calcutta, is the administration of a dose consisting of about half an ounce of pounded shipha bark mixed with twenty one black pepper corns, and that this is a very dangerous means, the mother as a rule dying when it is resorted to

Lal-Chitra.—Plumbago zeylanıca —Chitral (Hınd), Chitla (Beng) Chitra (Bo), Chitlra or Chitlra Mulam (Tam), and Plumbago rosca (syn. P. cocanea), Lal chitra, chita, or chitra (Hınd, etc) Shivappu chitlira (1am), N. O. Plumbagınea (see Fig. 48)—The roots, and probably other portions of these plants, contain a highly aerid crystallizable non-alkaloidal principle called plumbagın. The bruised roots applied to the skin cause vesication. Tiken internally, in large doses, plumbago root acts as an irritant or nareotico-irritant poison.

Plumbago root in India is sometimes administered internally as a poison, and Chevers' refers to two fatal cases, one of them as case of homicide, in which it was so employed. More commonly in India plumbago root is used for the purpose of cuising abortion. With this object it is cometimes given internally, and has been more than once detected as plumbagin in pills stated to have been administered for this purpose. Usually, however, it is employed as a local irritant application to the os uters, a portion of the root or a twig of the plant being pushed into the vagina, and sometimes even into the uterus. In other cases (the oction-covered end of an abortion stack (p. 321) is smeared

<sup>1</sup> Chevers Med Jur , p 716

with a paste made from the powdered roots, and I once met, with a case in which a lump of such paste was simply thrust into the upper part of the vagina, and was found there after death. It is also used as an initiant to skin by malingerers or to support false charges, see Case bloom.

DETECTION —The roots are 1 to 1 an inch in diameter, dark brown externally, and reddish within, from them and matters



Fig 48 —Plumbago zevlanica

containing it, plumbages my be extincted by digesting the substance under examination with alcohol, straining this off, and evaporating the tincture to dry ness. The dry residue from the tincture should then be digested with a small quantity of water rendered slightly alkaline with custor potash, the solution obtained filtered, acidulated with hydrochloric acid, and shaken with ether The other is then separated, evaporated to dryness. and the residue tested for plumbagin. Plumbagin treated with caustic potash solution dissolves, forming a bright crimson liquid Hydrochloric acid added to this changes the colour to yellow, and on standing the liquid deposits yellow flocculi of plumbagin, which may be separated by shaking the acidified fluid with ether An alcoholic solution of plumbagin gives a crimson precipitate with solution of basic acetate of lead 1

Case -Lal Chitra applied to skin to fabricate a 'bruise'-In 1898 a case was reported of a false charge of dacoity having been made at Mur shedabad Bengal, in which the alleged injuries of the complainant were shown by the civil surgeon to have been artificially produced by the application of this irritant. The man Jitan Ali Mir, was found gullty of bringing a false charge, and sentenced to four years imprisonment—Ind Med Gaz , 1900, p 8

Plumieria acutifolia (syn P. acumenata) N O Apocynacea, Khairchampa (Bo ) Gobur champa (Beng ), Dolochapo (Guz ) (see Fig 49) - This small tree, common in India, has blunt truncate branches and white and yellow flowers It abounds in viscid juice, which dries into a substance resembling india-rubber "The root is a violent cathartic and the blunt ended branches are used to procure abortion 2 The plant does not give any blue or green reaction with hydrochloric acid, like Ceriera theretia and C odallum It contains plumieric acid in combination with calcium 8

Eve's Apple-Tree or Kaduru, or Taberna montana dichotoma R , N O Apocynacea This is a native of Ceylon and South India Its Ceylonese vernacular name is Diar Kaduru (Kadura = "tiger') Flower emits a fine scent Fruit attractively coloured and of tempting appearance, orange externally and deep crimson within Shape globular with appearance of a piece bitten out Is deadly poisonous, but its symptoms have not been described It is called by Mohammedans "the Forbidden Fruit of Eden," and by South Europeans ' Eve's Apple"

Randia dumetorum, N. O Rubiacew, Mainphal (Hind), Gelaphal (Bo) Maruk kailan kay (Tam), Menphal (Beng), Mindhal (Guz) (see Fig 50)—Dr George Bidio 4 states that the fruit of this is apparently an irritant emetic, and is used to

A colouring matter obtained from rhubarb root gives with caustic potash solution, a crimson colour similar to that given by plumbagin solution of it however gives with acctate of lead solution, an orange precipi tate not a crimson precipitate like plumbagin
<sup>2</sup> S Arjun Bom Drugs, p 210
<sup>3</sup> Watts, Dict VIII, p 1656

<sup>4</sup> Pharm of India p 118

produce emess by the poorer classes in Mysore the dose being one ripe fruit well bruised. According to Auslie an infusion of the took bark also acts as an emetic and Dymoch mentions that the bruised nut is used in the Concan to preserve grain from the attacks of insects and as a fish poison. Chevers on the authority of Edgeworth states that the fruit is used in the

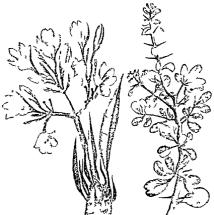


Fig. 49 —Plumieria acutifolia

Fig. -0 - Randia dumetorum

neighbourhood of Jalan har as an ingredient in medicines given by the mouth for the purpose of procuring abortion [Inprintication—Dymock 2 gives the following description of the dried fruit — About the size of a crab apple globular or oval reddish brown crowned with the rim of the cally. It consists of a pericary and shell which contains the seeds

<sup>&</sup>quot; Med Fur p "20

<sup>&</sup>quot; Mat Med ca p 408

embedded in pulp The shell is hard and thick, two celled, the dividing septum being thin and membranous The pulp is grey, and has a nauseous taste and smell. The seeds are small and oblong, about 1th of an inch in length, slightly flattened, very hard, and of a brown colour. The average weight of the fruit is about sixty grains? In the dried fruit the seeds are found agglutinated together into two rough masses, each something of the shape of a coffee bean, but larger, one mass in each cell of the fruit.

Rue, Ruta gravolens, N. O. Rutacers, yields by distillation a pate yellow volstille oil of a strong disagreedule volour and acrid butter state. The oil—officinal B.P. and I.P.—appears to be the active principle of the plant, and is used in medicine, internally as an emmenagogue in does of from two to five drops, and externally as a rubefacient. Garrod gives the medicinal does of the powherd leaves as the city to forty grains. In large doses rue acts as an irritant poison, causing vomiting and prostation, with a feeble slow pulse and coldness of the extramities bwelling of the tongue and salivation have also been observed. In Europe, rue has been frequently given or taken, it is said with success, as an abortifacient. Ruta angustifolia, Suido (Hind.), Sudap (Bo.), Arrada (Tan.) is cultivated in most parts of India, and is used in native medicine in the same way that R graveolens—for which it appears to be a perfect substitute—is used in Europe.

Savin.-The leaves and tops, and the berries of Jumperus sabina, N O Conifera, contain an acrid volatile oil-oil of Savin-which when applied to the skin, acts as a vesicant, and when swallowed, as an irritant poison. In addition to its irritant action on the alimentary canal, savin causes congestion of the kidneys and uterus. Owing to its action on the kidneys, strangury, hamaturia, and even suppression of urme, may be present in cases of poisoning by it Savin is used in medicine as an emmenagogue in doses of five to fifteen grains of the powdered tops, or one to fifteen minims of the oil In England, savin is popularly believed to be an effectual abortifacient, and cases of poison ing by it are generally due to its having been given with this object Savin often fails to cause abortion, sometimes it succeeds generally, however, at great risk to life Several cases are recorded where its administration caused abortion followed by the death of the woman IDENTIFICATION .- There is no reliable chemical test for the oil If the leaves or tops have been given, fragments of these may be found and identified by comparison with a known specimen. The woody fibres, like those of other conferm, exhibit circular discs. The leaves are minute and have a sharply accuminated point, while those of yew, another poisonous plant of the same order, have a lancet shaped apex Savin leaves differ also from yew leaves in giving off when rubbed a strong peculiar odour

Sosp-nuts, Rilha (Hind and Bo), Ponnau kotta: (Tam), Ringin (Mar), the frunt of Sapindus trifoliatus (syn. S. cmarginatus), N. O Sapindacca.—These are scarcely to be considered 'poison'. According to Dymock, the pulp, in four grain doses, is given internally as an authelimitic and tome, and a native authority recommends its administration in seventy grain doses, with about eight grains of scammony, as a purgative. Sosp nuts contain the glucoside saponin,

a white amorphous powder, soluble in water, and forming a solution which froths like a solution of soap Saponin is an undoubted poison. Blyth states that one and a half to three grains of saponio administered by the mouth produces slight symptoms in the human subject, and estunates that forty grains administered subcutaneously to an adult would endanger life baponin locally applied acts as an irritant, subsequently producing paralysis and annathesia, absorbed into the system, it paralyses the nerve centres and the heart. Hence, as stated by Blyth, in poisoning by sanonin the symptoms would probably be great muscular prostration, weakness of the heart's action, and diarrhesa. and after death post mortem appearances of irritant poisoning would probably be found Saponin is present in many other plants, eg in senega, in sarsaperilla, in the bark of Quillana caponaria (scap bark), and in Agrostemma aithago or 'common corn-cockle' Blyth suggests that accidental mixture of corn-coulde seeds with wheat may possibly account for some of the mysterious cases of poisoning which have occurred from time to time after eating cakes, bread, etc. IDENTIFICA TION—The dry berries of S. trifoliatus have a shrivelled brown translu cent skin, and are met with either in threes united together or separate, and showing a heart shaped scar on one side, each berry contains a single dark red brown seed of similar shape to the fruit. The fruit pulp has a fruity smell, its taste is sweet at first, afterwards very bitter Saponin may be obtained from matters containing it by digesting them with hot spirit, from which the saponin deposits as the liquid cools The deposited saponin may then be purified by dissolving it in the least possible quantity of boiling water On the addition of absolute alcohol to this, the saponin precipitates Saponin is insoluble in cold alcohol and in ether, strikes a red colour with sulphum acid, and dissolves in water, forming a soan like solution.1

Paka or Kusum, the seeds of Schleichera trijuga, N O Sapindaceo The seeds of this plant, the Kusum of Bengal and the Kosumba of Ceylon and the Straits, which is the so-called "Lac tree" of India, yield an oil which has been found by Dr Chum L. Bose to be occasionally mixed as an adulterant with Mustard oil or Macussar oil and thus cause trritant poisoning symptoms This oil is a yellowish white clear liquid consisting according to Lavkoivitoch, of glycerides of laune paluntic, arachidic, oleic and other fatty acids, and hydrocyanic acid in small proportions is always present, about 0-3 per cent (Bose) The symptoms induced by these seeds or their oil are those of irritant poisoning, with guddiness, dilation of pupils, and in fatal cases death by syncope presumably due to the hydrocvanic acid Post mortem shows congestion of stomach and internal organs, and the blood has a bright red colour as in hydro-cyanic acid poisoning IDENTIFICATION - Fruit is a grape of the size of a nutmeg and coated by soft blunt prickles The seeds are brown, oval and smooth, about } an inch in length , the kernel has a deep groove along its middle and yields the oil called " Pake oil' of the composition above noted.

Myrabalan, Termundia bilierca, N O Combritacea, Bhavash, Balacra (Hind and Reng), Behada, Efid. (Bo), Teursh Jay (Tam).—
Two cases of accidental poisoning by the irus of this tree have been reported. In one, three boys were poisoned, all, however, recovered in the other, a woman and two children, one of whom was a weakly gril.

Blyth, Poisons, p 439

Ind Med Gaz , 1919, Not
 Do Chem, Analyser : Rept , 1878-79, p 14

<sup>&#</sup>x27; Chevers, Med Jur , p 273

<sup>· 100</sup> Unem, Analyses 1 1291 , 1015-10, § 24

of eight or nuc, were poisoned, and of these the girl died, the two others recovering. The symptoms present were nausea and vomiting followed by narcotism. The narcotic properties of the fruit reside in the kernel but it is not known to what they are due. IDENTIFICATION—The fresh drupe is oborate somewhat five angled about the size of a nutmeg, fleshly, and covered with a grey sikly down. When dry it is of the size of a gall nut, and of a dirty brown colour and astungent taste. It con tains abundance of tannin. The stone is hard, and encloses a sweet oilly kernel.

# Jequirity or Indian Liquorice.

Abrus precatorius, N O Leguminosa, vernacular, Rati, Gunz, Gungchi (Hind) Gunza (Bo) Gudumani (Iam) Charrots (Guz) -The seeds, roots, leaves, and other parts of this plant are irritant when applied to mucous membranes, and may be swallowed in considerable quantity without producing any ill effect, but if a small quantity of the seeds or of other portions of the plants be bruised and their juice injected under the skin of an animal, it rapidly proves fatal, producing general depression, drowsiness, fall of temperature and ha morrhagic lesions somewhat as in poisoning by snake venom It is largely used in India for the criminal poisoning of cattle and occasionally for homicidal purposes (see Case, p 589) For poisoning cattle it is used by the low caste leather workers (chamars) in order to procure hides cheap. They pound the decorticated seeds into a paste with water and make the mass into small sharp pointed spikes or 'needles' (sur or sutarr) which they harden in the sun When used two of the suss which are about three quarters of an inch in length, are inserted into holes in a wooden handle by their base. A blow is then struck with great force, driving the sur protruding from the handle into the animal's flesh, where it is left, and causes death within 18 to 24 hours

Action.—The uritant and poisonous action of Jequinty seeds was ascribed by Cornil and other continental pathologists to a bacillus Dr L A Waddell disproved this theory, by an elaborate research! supervised by Professor Robert Koch, and in canjunction, with Dr. Warden hiswayd, that the actisa principle, was a chemical substance of a protein nature which they isolated and called abria. Abria is a tox albumen bearing much resemblance to snake-venom, and animals may become immune against it by repeated doses, and, like snake-venom it has been resolved into globulin and other forms of albumin. It acts as

<sup>1</sup> The Non-bacillar Nature of Abrus Poison, Beng Secretarist Droce Calcutta 1884

a blood poison imparting to the red blood corpuscles a tendency to coagulate and form thrombi. Of the seed half a grain sub cutaneously injected is sufficient to kill cuts in twenty to forty hours and one and a half to two grains is sufficient to kill cattle within forty-eight hours. In animals killed by abrus poisoning adema of the subcutaneous tissue is found at the seat of the injury if the animal has lived over twenty four to thirty hours. The mucous membrane of the stomach and intestine is found highly injected and numerous hamorrhagic points are seen on the surface of the mucous membrane of the intestine and also in the interior of vascular organs eq the lungs liver and spleen 1

Identification -The seeds are spherical about the size of a pea polished and of a bright scarlet colour with a large black spot at one end other varieties are white or blackish, their microscopical structure is peculiar 3 Their average weight is about one and three quarters to a little over two grains The root of this plant is officinal in the Pharmacopicia of India as a substitute for liquorice and the seeds are used as small weights by jewellers a rate' being the weight of one seed For identification of the suis small slices or scrapings are made with a sharp knife placed with a drop of water on a slide and examined with a microscore The characteristic thick walled cells from the Abrus seeds are readily recognize 1.3 A drop of a dilute extract of a sur if placed in the eye of a frog causes within 24 hours on intense inflammation

( ase -Hypodermic poisoning by Jequirity (abri 3) see Is-How see I il -At Bankipur Bengal in 1880 a man was killed by a site ri driven into his neck by a clam ir at the instance of a woman. The latter deposed as follows — I used to earn my living at Sunt Aman Khans. His clela t rned me out and would not give me sufficient food. I stole a seer of rice and he abusel and beat me I was crying over my ill fate. Mugyra saud. Why are you crying? I saud. If some one killed him it would be well. She said. Call Sui tokhi and he will put you up to someth 1 g I then went to Suntokhi Chamar and told him to get some med cine that would kill Aman Khan He said he would go to Ma ha and bring some After ten lays he told me he had 1 ot been to Magha Mugyra then tol I me to go to Dooly Cham'ir who was a great po soner an I had killed several persons Dooly on being spoken to aske I for 50 or 100 rupees I therefore remained quiet. After ten days Dooly came to my ho use at I wanted five rupees and seven pieces of cloth of seven colours and black p geous and a black hid I gave hum one rapes and a half the price of the things The next morning he came to the for five rupees advance saying I e would destroy my children if I did not pay it by

L 4 Waddell op cil.

By Dr Norris Woll nden and others Proc Roy Sec. 1889

Described by Dr D Cunningham Ind. McI Gar., 1899 and reproduced in Plantacopropi Indica I 482

means of witcheraft! I paid him five rupces, after this he again threatened me, and I gave him ten rupces. When eight or ten days had passed he said he would do what I wanted, and on the night fixed, he smoked in my house, and then at midnight stabbed the wrong man. Doth prisoners were sentenced to transportation for life under is 804 and \$23,00 the Penal Code. The wound was penetrating about \$2\$ inch deep on the right check, it was moused, and "2 small, black, hard substances" extracted. The patient died on the third day—"The brain and its membranes and the lungs, liver, spleen, and kindrys were congested. The coats of the stomach were congested, and some eechymosed spots were visible on its internal surface."—Dr. Warden in #harmacograph Indica 1, 446

Case -In 1873 a man near Rawalpindi when sleeping was awakened in the morning by two blows on the neck, and appears to have seen his assailant retreating. After he went to work, his mother found two substances, each a little larger than a burley corn, on his bed midday he complained of pain in the neck and his mother found two punctures, and out of one of these she picked a small black substance similar to those found on the bod. He was taken to Rawalpindi on a charpoy, arriving the following morning, and immediately examined by Dr Ince, who reported 'I found a swelling on the right side of the neck in which were two small punctures about 2 inches apart. He was then sensible, but suffering from severe pain in the neck, difficulty of swallowing and much fever The swelling and pain rapidly increased, and cryspelas supervened. He died exactly three days after being stabled. The post mortem examination showed much swelling of neck, extending over right side of chest also, and the skin had a hvid appearance On cutting into the swelling much blood was found, and inflammation pro ducts which had extended to the right lung, which also was much inflamed and adherent to the ribs by means of bands of lymph The spleen was enlarged ' The "three small black substances ' were examined by Dr Center, who recognized a part of abrus seed as used in cattle poisoning and microscopically their structure was found to agree with those of rati (jequirity) seeds On insertion below the skin of a dog, the animal died in 50 hours, and on post mortem examination diffuse inflammation wound puncture was found -Dr Center, Paniab Chem Ex Rept , 1875

Cases —Homicadal Abrus poisoning —In 1871, in Bengal a man was mundered by a setter being driven find his side, lately another man was wounded by a setter while saleep, and died from 'lock paw , a third man was wounded with a setter, being excised This man is cousin, however, died from the effects of a setter being acressed This man is cousin, however, died from the effects of a setter being driven into his check (see Case above) Beng Police Rept, 1871 (d) and (e) One case of homicadal abrus 'sus poisoning was reported in the Panjab in 1893 and another in 1899, in addition to that in 1873 (see Case above) (e) The Civil Surgeon, Muzaffargath, forwarded a case in when it appeared that death had occurred in a Mohammedan make, aged 30 years, from "needle or "sus 'poisoning On post mortem examination there was a sloughing wound on the right is de of the neck, with edema and inflammation extending from the right ear downwards over the neck, chest and abdomen Death is said to have occurred on the fifth day after receipt of the injury. No foreign body was found in the wound, but wo sharp conical "needles' forwarded along with the viscera were found to consist of pounded "rati" seeds (Abrus precatorus) Maj Black, Panjab Chen Ex Rept, 1918

### CHAPTER XXVII.

## ANIMAL IRRITANT POISONS.

These may be divided into (1) poisons secreted by highg animals, (2) poisons generated by dead animal tissue, including food-poisoning

### POISONS SECRETED BY LIVING ANIMALS

### SNAKE VENOMS.

Death from snake-bite is usually accidental. From 15,000 to 20,000 deaths are annually reported in India as being due to 'Snake-bite,' but there is no doubt that this alleged cause of death conceals some undiscovered crime. Cases of undoubted innuider by hanging, strangulation, abortion, etc. have been found to be conveniently reported as 'Death by snake-bite It is desirable, therefore, that the bodies of persons alleged to have died from snake-bite should be sent by magistrates, whenever possible, for examination by the civil surgeon or other medical others."

In 1900 the reported mortality from snake-lute in India was no less than 22,933 deaths, namely, in Madras Fresidency, 2007, in Hengal, 10,577, in Bombey, 701, in N. W. P. & Oudh, 6,056, in Papinds, 869, in Burms, 874, in Central Provinces, 974, in Assam, 170; in Coorg. 1, in Berns, 104, in Aguere Mersan, 4; in Bangalore, 2.

Homicide by snake-bite has not been reported of late years; but cases of cattle thus poisoned are reported (see p. 601), and many of the native quack-doctors keep dired cobravenom as a remedy <sup>3</sup> So that it may occasionally be used for

oul), and many of the native quack-dectors keep arried consvenom as a remedy <sup>3</sup> So that it may occasionally be used for <sup>1</sup> This death rate is over 100 per million, ranging from about 45 per million in the Panjab to about 130 per million in Bengal In one distinct of Bengal,

namely, Burdwan, the anake his death-rate was 178 per million as the average of the 10 years ending 1803 A non poisonous snake may be sent as evidence of the alleged hite with the body of a person who has been mandered otherwise

In a case of poisoning in Calcutt i in 1891, amongst the suspected articles sent me for examination from the house of the accused was a gunnry mass of homicidal purposes though undiscovered. The crime of using snakes for murder is mentioned in Hindu and Mohammedan law, and formerly criminals in India were sometimes executed by snake bite.

In Hindu law it was enacted that "if a man by violence throws into another person's house a snake or any other animal of that kind, whose bite or sting is mortal, this is Shahesh, i.e. The magistrate shall fine him 500 puns of cowries and make him throw away the snake with his own hand" Halhed's Code of Gentoo Law pp 262 263 Mohammedan law strangely provided that "if a person bring another into his house, and put a wild beast into the room with him, and shut the door upon them, and the beast kill the man neither kisas nor divat is incurred, and it is the same if a snake or scorpion be put into the house with a man or if they were there before and sting him to death But if the sufferer be a child, the price of blood is payable ' (quoted by Chevers, M, 381) An execution by snake bite is thus described by Terry of Sir Thomas Roe's suite There was another condemned to die by the Mogul himself (while we were at Amadavar) for killing his own mother and at this the king was much troubled to think of a death suitable for so horrid a crime, but upon a little pause he adjudged him to be stung to death by snakes, which was accordingly done There were some mountebanks there which keep great snakes to show tricks with them, one of these fellows was presently called to bring his snakes to do that execution, who came to the place where that wretched creature was appointed to die, and found him there all naked (except a little covering before) and trembling. Then suddenly the mountebank (having first angered and provoked the venomous creatures) put one of them to his thigh which presently entwined itself about that part, till it came to his groin. and there it bit him till the blood followed, the other was fastened to the outside of his other thigh twining about it, and there bit him likewise. Notwithstanding the wretch kent on his feet for near a quarter of an hour, before which time the snakes were taken from him, but he complained exceedingly of a fire that with much torment had possessed all his limbs. and his whole body began to swell exceedingly. half an hour after they were taken from him, the soul of that unnatural monster left his growing carcase

There are also the classic instances of the employment of snakes in war by Hannibal and Antiochus defeating the Romans in a naval action by throwing earthen pots filled with serpents

dried cobra venom weighing over 100 grains -L. A Waddell Beng Chem Ex Rept , 1884

into their ships, and similar episodes are related of the Stracens . and in respect to suicidal use there is the story of Cleopatra and others

Case -- Homicide by snake bite -- In this case, two snake charmers were convicted at Purneah, Bengal, in 1869, of causing the death by anake bite of three men The prisoners it was proved, partly by threats, and partly by assurances that it was in their power to prevent ill effects following induced four men to allow themselves to be bitten by a krait All four were possoned, one only recovering What the motive for the crune was did not appear -- Fayrer a Thunatophidia of Inlia, p 51

The popular division of snakes into poisonous (or venomous) and non-poisonous, although not strictly correct scientifically, may be adopted here for toxicological purposes Poisonous snakes, of which many species are known within Indian limits, belong to one or other of two families, namely, the (1) Colubrida and (2) Vipers or Viperida All vipers are poisonous, but only two sub families of colubrine snakes are decidedly noisonous, namely, Elamna, and the sea-snakes (Hudronhadae) Poisonous snakes are distinguished from non-poisonous by the presence of poison glands The poison gland is usually situated one on each side of head above the upper jaw and behind the eye. and it communicates by a duct with the poison fangs, which are enlarged, channelled or perforated' teeth of the anterior maxilla There is no sure way of distinguishing a poisonous from a harmless snake by external characters except by the dentition—the presence of grooved teeth—and an intimate knowledge of the various genera and their head shields and scales, for which the zoological text-books should be consulted 1

The chief points of distinction between the two families of poisonous enakes are roughly -

Poisonous colubrit e st akes	Vipers
Body usually long and cylindrical     Head small, seldom broader than body covered by large scales or shields of special form or number	Body usually short with narrow neck Head large broader than body, tri- angular and covered by numerous small scales usually

- beside polson lang 4 Lye has round pupil

2 Marillary bone carries other teeth Maxillary bone carries only popon Eye has vertically elliptic pupil

Boulenger's Reptilia Fauna of British India 1890 or Fayrer's Thana tophidia of India or Ewart's abstract of the latter or Major F Well's (IMS) excellent practical manual The Poisonous Terrestrial Snakes of British India Bombay, 1903

The chief poisonous species of Indian land snakes are the following . the most common deadly ones are marked \* \*, the less common deadly opes\* -

### COLUBRING-

\*\* Cobra Nata tripudians Vern - Nüga, Keautsa, Kula Sanp, Gehusanp Throughout India and up Himilayas to 8000 feet Hooded \* Hamadryad or 'Tree Cobra,' or 'King Cobra,' Naia bungarus or Ophiophagus elaps Vern — Sankerchor From Lower Bengal, southwards through India, Assam, elapine

and Burma attain ng a length of 15 feet \*\* Blue Krait, Bungarus caruleus, attaining 44 feet

lavanus from Sikkim to N W

\* Banded Krait, Bungarus Jascialus Vern - Sankni, or elapine

VIPERING -These are divided into 'vipers proper, Viperina, and the 'pit vipers' or Crotaline, the latter having a deep pit on each side of the sport between the eye and the nostril, and are confined to the hilly regions The chief species are -

\*\* Russell g Viper, or the Chain Viper Vipera russells or Daboia russells Vern — Bora, 'Ticpolonga,' 'Gunus,' growing to 51 feet \* Keel scaled Viper, Echis-carinata Vern - Fursa Afa, or Kapar, attaining a length of about 2 feet Kapar, attaining a rengen or account and arboreal
Ancistrodon hypnale or Hypnale nepa Vern - Karawala Crotaline

in Ceylon and W Ghats south of Bombay, and A hima-

The cobra, hamadyrad, and daboia are the most deadly of all snakes After the cobra the great Russell's viper is the most deadly of Indian snakes, next comes the blue Krait, the little viper Echis c (with a dart-shaped whitish dark-edged mark on head), the great banded (blue and yellow) Krait (often confounded with the harmless Lycodon fasciatus of Assam and Burma), which is not very virulently poisonous, so little so that its bite is believed often to be non-fatal The bite of the species of callophis, trimeresurus, and ancistrodon does not usually produce death in adult human beings and large anımala

Physical and chemical characters of snake renoms -The physical characters and chemical composition of snake-venom differs to some extent according to the species and family to which the snake belongs The venom of the cobra when freshly ejected is a light amber-coloured liquid like clear varnish of a specific gravity of about 1 046 and feebly acid reaction It dries rapidly in the air into a vellowish film. like gum arabic, which tends to split up into bright vellowish scales

In Assam B lividus, in Ceylon B ceylonicus, in Sikkim B niger, and E of Sikkim B bungaroides

and granules This yellow powder has an aerid edour and is an irritant to mucous membranes. It is soluble in water the solution becoming actively toxic. The dried venom revins its activity for several years and may be heated up to 100° to 125° without losing its poisonous properties. In 1833 Dr. Werr Mitchell showed that rattlesnake venom could be split up by dialysis etc. into two toxic principles a piptone (albumose?) and a globulin each with different properties, and he considered that differences in the action of snake venom of different species of snakes depends upon the relative properties of these two substances. Norms Wolfenden applied this discovery to the venom of the cobra and Indian vipers differentiating out several active constituents with different poisonous properties.

Action and symptoms of snake-venom -The physiclogical effects of snake venom differ to a considerable extent in kind according to the species or family to which the snake belongs The broad differences between the symptoms of possoning by the colubrine cobra and the vipers were described by the early Indian observers especially Dr P Russell, Sir Joseph Fayrer Dr Wall and Dr V Richards. Their experi ments were of a somewhat crude kind the animals experimented upon usually receiving their poison by a bite from the snake a method open to many fallacies The more precise muthod of experiment by means of hypodermic injection of a measured! quantity of fresh venom of ascertained strength and activity into a series of animals of given weights and verified by control experiments, and post mortem examination was first employed in India by Dr L A. Waddell in a large series of observations conducted at his own expense with the result of indicating the remedial treatment of snake bite by inoculation.2 In the then absence of research laboratories in India the further researches on exact modern lines into the essential nature of cobra and Indian viper venom were a few years afterwards prosecuted in Europe with dried venom notably by Lauder Brunton Norris Wolfenden, Fraser, and latterly Calmette

Snake venom of both collabrine snakes and vipers has a local as well as a remote action. Locally it acts as an irritant to the tissues, and hence, when introduced into a wound causes immediate burning pain in the wounded part followed by swelling and inflammation. Even when applied to thin unabraded membranes such as the conjunctiva, it acts as a local irritant.

<sup>1</sup> Proc Roy Soc 1881 Vol. XXXII p 338 2 The Effect of Serpent-Venom, Sc Mem. Me il Offer, IV, India Calcutta 1889 Sec also pp 557-8

Its remote action is exerted mainly either on the nervous system, or on the blood, or on both, and may not only be the result of its absorption into the system from a wound, but may even result from its absorption through unabraded delicate membranes, such as the mucous membrane of the stomach 1 The remote action of the poison of the cobra and other colubrane snakes and including sea-snakes,2 seems usually to be mainly exerted on the nervous system, whilst that of the Indian vipers is especially upon the blood These two classes of effects are attributed by Weir Mitchell respectively to the toxic peptone which acts more particularly on the tissues, causing inflam-I matory action with much swelling and extravasation of blood, whilst the globulin acts more particularly on the nervous system, paralyzing the heart and the respiratory centres

Action on the nervous system -An interval in duration usually elapses between the bite of a poisonous snake, and first appearance of nervous symptoms. In the human subject this interval in cases of cobra-bite may be 15 minutes to about an hour which is the average according to Wall, but may be longer, it is often longer in cases of bite by the less venomous snakes In cobra bite in the human subject (see Case p 597) the chief nervous symptoms are a feeling of intoxication, followed by loss of power in the legs, the patient staggering or falling if he attempts to walk or stand The loss of power then spreads to other muscles, those of the tongue and larynx becoming early affected, and the powers of speech and deglutition are lost, the saliva trickles away, the power of expelling it having ceased, as in glosso-pharyngeal paralysis The paralysis then becomes general, the respiration slow, and it becomes weaker and weaker till death occurs by asphyxia. due to gradual paralysis of the respiratory movements and the heart beating for some time after the respirations have ceased Nausea and vomiting are often early symptoms, and asphyxial tremors (not convulsions, as the general paralysis precludes these) may precede death. The pupil as a rule, is but little affected. Death seldom occurs before 20 minutes to half an hour, even when the largest doses are given Very similar nervous symptoms usually follow the bite of other colubrine

<sup>1</sup> Thanatophidia of India, p 64, L A Waddell in Sc. Mem Med Offrs,

P. 20
 For exhaustive experiments on the venom of sea-snakes see Physiological Action of the Poisson of the Hydrophida by L Rogers M D 1 M s. Proc. Roy. Soc, 7th May, 1933 and reproduced in Ind. Med. Gar, pp. 209, set, 1938
 On Indian Snake Poissons, p 12
 Lander Brundon considers that the terminations of the motor nerves are

affected -Proc Roy Soc , 1875, Vol 23

snakes but as the poison is less active more chronic symptoms may develop

Thus Wall in experimenting upon anumals with the poison of Imagurus facilities to make the insome excess symptoms were caused by it exactly resembling those seen in coher late, while in others the first effects of the poison on the nervous system were slight and soon passed off, but after an interval of two to five days were followed by a fresh set of constitutional symptoms. The animal became weak, pursuent discharges took place from the eyes, nose and rectum the unne became albuminous, and death occurred from enhaustion several days after the bit. In these cases, however, there was no tendency to harmorrhage

Daboia-bite also causes marked nervous symptoms, but the paralysis is more general, does not specially affect the tongue and laryax, and salivation is, as a rule absent. Con vulsions are often present early in the case, and the pupil is usually dilated. In Echs bite the nervous symptoms are, as a rule comparatively slight in severity. Mental shock may, to some extent modify the nervous symptoms present in a case of snake bite, and from recorded cases it appears that the bite of a non-poisonous snake may give rise to mental shock so severe as to cause death.

Action on the blood in viper-poisoning.—Martin of Melbourne has shown that the very rapid deaths are due to an extensive intravascular thrombosis, especially of the pulmonary arteries, and this has been confirmed by Weir Mitchell in regard to the American vipers—the rattlessakes. It has, moreover been directly observed with respect to the great Indian viper, the Dabous, by Captun G Lamb! This intravascular thrombosis in the pulmonary arteries explains the leading symptoms in the rapidly fatal cases namely, the graying with quickened and laboured respiratory movement and violent convulsions soon ending in death

In the less immediately fatal cases of viper-poisoning the most straking characteristic of the blood as that it has completely lost its power of coagulating, and this condition seems to account for the large bloody extravasation and celema and bloody oozing at the site of bite, the extensive hemorrhages from mucous membranes, eachymotic patches and oxdemas which are such prominent symptoms of the more chronic cases of viper-poisoning

Cobra-poison in laboratory experiments causes source lecenolysis and delays the blood from clotting. The poison dissolves out the hiemoglobin from the red corpuseles, but the poisoning danger as a rule ceases with the disappocarance of the

nervous symptoms, whereas, with vipers the blood-poisoning symptoms may continue for days after the nervous symptoms lave disappeared, may end in death from exhaustion, and in echis poisoning are often the chief symptoms present. Further, owing to this special tendency to blood-poisoning, danger to life in cases of daboia and echis bite may continue long after the nervous symptoms have been recovered from, while in colubrine snake poisoning, danger as a rule ceases with the disappearance of the nervous symptoms

Case —Cobre bute—accidental —A coolie was bitten on the shoulder by a cobra about mindight. He immediately felt a burtung pain at the spot bitten which increased. In 15 minutes afterwards he began he said to feel intoxicated but he seemed rational and answered questions intelligently. The pupils were natural and pulse and respirations normal He next began to fose power in his legs and staggered. In 30 minutes after bitch his lower jaw began to fall and frothy viscul saliva ran from his mouth. He spoke indistinctly and the paralysis of the legs increased Forty minutes after the bite he began to mean and shake his head from said to side and the pulse and respirations were somewhat accelerated, but he was still conscious and able to answer questions. There was no paralysis of the arms. The breathing became slower and slower and a length ceased one hour and ten minutes after the bite, the heart beating for about a manute after the respiration had stopped.

Gase—Russell's uper bite—chronic — A Mohammedian aged 40 was bitten on the finger by a Dalona. The bitten part was excised soon after, and stimulants given. The band and arm became much swollen and on the same day he passed blood by the rectum and bloody urner than next day he was sick and still passing blood from both channels. In this stute he remained eight days constantly losing blood and died on the ninth day—Ind. Med. Gas. June 1872

Post-Mortem Appearances in Snake-Bite.—Tor the medical jurist the cline protical point is how to recognize snake poisoning post mortem Indevour should be made to distinguish between Colubrine and Viperine cases. In Colubrine cases, Cobra or Krait there is seldom much to indicate the site of the puncture. In some cases you may fail to find it. The blood is generally fluid and hemolysed crusing crify staming of the vessels. There is very little definite to indicate the cause of the death.

In Viperine cases, Daboia or Echis, there is generally much discoloration, swelling, and infiltration, at the seat of the bite, and extensive cellulitis in its neighbourhood. Though the blood is usually found elotted in small animata all autopsies in man have shown the blood fluid. There is often evidence of hismorrhage into the bowel purpuric spots on the pericardium and hismorrhages may be found in many tissues.

Antidotes and treatment of snake-bite—The appalling loss of life and the horribly sudden nature of the death from snake-bite has always stimulated a search for antidotes Of the many so called antidotes' to snake-venom, however. permanganate of potassium was the only one that could be said to be of any use whatever, but even it is no true antidote. as it only destroys the venom when it actually comes into direct contact with it, and is powerless to counteract the poison once the latter has entered the circulation

In 1888, as a result of a large series of experiments upon Indian serpents undertaken expressly ' to afford indications for combating the action of the venom on man, Dr L A Waddell established the hypothesis that 'immunity may be acquired by the imbibition of small doses of the venom," and in support of this view he instanced the then newly discovered (but still unformulated) doctrine of antitoxins as demonstrated by Dr Wooldridge in regard to anthrax protection,2 in these words -"The protection conferred by vaccine' being it is alleged, attributable, in certain cases to the action of the soluble chemical products resulting from the growth and development of the morbid germ <sup>3</sup> In reviewing Dr Waddell's monograph the Proneer on the 2nd April 1889 in a long article said -"Dr Waddell propounds the theory that it is because the immunity is an acquired condition-a toleration to the venom established through the imbibition of small quantities of the in other words that the snake inoculates itself against the consequence of its own virus. And if the snake, why not the man, for that is the conclusion evidently to which Dr Waddell means to work up . Though after all it is a question whether it would be worth while for every one in India to be inoculated against the ofichance of being bitten by a snake' Amongst the notices in European scientific journals of this research by Dr Waddell on the artificial immunization against snake-venom, Professor Henry de Varigny gave an editorial notice of two columns in the Rerne Scientifique of 22nd February, 1890 calling attention to its great practical import for India and other tropical countries as a life saving measure

Dr Waddell in concluding that monograph stated that he was about to submit his hypothesis with the antitoxin features to actual experiment Circumstances, however, prevented his doing this himself, owing to no facilities whatever having been given him for this work by the Government, but over five

\* Op cit., p 28

<sup>&</sup>lt;sup>1</sup> An Inquiry into the Eff et of Serpenternom etc., Se Men Medl Offis, IV 1899 also Ind Med Gar, May 1899 p 147 See also review in Isancer, and April 1893 and in Revie Scientifique Paris 22nd Petragra, 1890 <sup>1</sup> Iron Poy See, 1887 p 813 Og et p 27

years later, M Calmette 1 and Professor Fraser carried out the necessary experiments, after the antitoxin theory had become much more developed, and the protective antitoxin for snake-venom thus obtained is called 'Serum Antivenineux' or 'antivenene' It is the serum of the blood of animal (usually a horse) which has been rendered immune against serpent

venom by repeated injections of the venom

This 'antivenene' seems to have undoubted antidotal properties for cobra-bite as it is prepared for cobra-venom. It has, however, little if any value against riper- enom, which has been shown by Wall, Richards, Waddell, Wolfenden and Martin to have a different chemical composition and physiological action from cobra-venom, and Cunningham in 1896 by direct experiment found that 'the antidotal material (antivenene) contained in the blood of animals which have been artificially immunized against colubrine (cobra) venom is inert against viperine venom, and vice versal. 'I Latterly in the production of antivenomous setum a mixture of colubrine and viperine poison is used in the proportion of 30 of the former to 20 of the latter, and a supply of this new serum is now issued the every civil station and regiment throughout India. It rapidly deteriorates?

The local treatment, however, should never be neglected numely, the immediate sucking of the wound, lightning the limb above the bite and applying freely an alkaline solution of permangunate of potassium with free scarification, excision obtiten tissue and laying open the wound so that it bleed freely—this last perhaps is the most important of all. An if the severer symptoms set in, an attempt to maintain breathing should be made by artificial respiration and galvanism.

The permanganate treatment is adversely reported on by the authoritative experimenters Lamb and Bannerman Thlatter writes (I G M. 1912, 381, etc.)

The treatment of snake-bite by potassium permanganat was first used by Sir Joseph Fryrer, IMS, in 1869, who fount that the drug did not seem to have any power to a cert the lethal action of the poison." Wynter Blyth showed that when mixed in vitro with perminganate of potassium, cobra venom became innocuous In 1881 Couty and Lacerda performed certain experiments, showing that the lethal action of serpent's venom was destroyed when a 1 per cent solution of the drug was nijected into the tissues close to the place of bite In

Calmette s announcement was first made in February, 1891
 British Med Jur., 15th June, 1895 Sc Memoirs, IX., pp 1-80
 G Lamb i Ms., 4b., NS., p 11, 1902

1902 Ludder Brunton introduced the well known "lancet," in the hope that in this simple method lay a treatment for sinke bits which would be of great life saving value. Rogers reported promising results from experiments on various animals Lamb, on the contrary, conducted experiments which were not successful. The present investigation was instituted to obtain evidence as to the efficiency of the treatment in win.

It was decided that in the first series of experiments natural conditions of biting should be imitated as closely as possible. The test dose was thirt given by the actual bite of the Cobra or Diboia and it is to be noted that the Cobra, after having bitten, remains attached to his prey for an appreciable time, whilst the Daboia darts with incredible rapidity, and then releases its victim instantity. The latter snake occasionally

fails altogether in its strike

Dr Bannerman's experiments showed that—
(1) A dog bitton by a cobra cannot be saved by the local
application of powdered pot-sum permanganate rubbed in
after free incision of the bitten place, nor by a similar applica

tion of a solution of the powder

(2) That it may be saved by the immediate subcutaneous injection of 10 cc of a 5 per cent solution of the drug, but

that this solution is so strong as to act as an escharotic

(3) That if this treatment be delayed for even two minutes, it loses its efficacy

(4) That a dog bitten under hatural conditions by a Russell's viper (Daboia) cannot be saved by the drug however annued

"The conclusions as to the action of potassium permangnation product on small doses of cobrs venom injected just under the skin appear to be that this treatment is of some little use under these highly artificial conditions. It must be remembered, however, that a snake does not deposit its venom under the skin, but striking as it does with its fangs at right angles to the skin, the posion must usually be placed well below the fascia of the part, and therefore further removed from the applications of a chemical antidote. "With regard to Daboia venom injected just under the skin the results are very similar to those obtained with the venom of the cobra is that under such artificial conditions the treatment by five incusion and rabbing with powder of potassium permangiantle is of some little use. As a practical measure for employ ment after actual snake bite it appears to be of no use whatever."

Should the situation of the bite permit, at once apply a ligature above the bitten part. Wall strongly recommends that this should be a thick indiarubber cord or band, wound

several times tightly round the limb 1 Failing this, two or three ligatures, at intervals of a few inches apart, should be, as recommended by Fayrer, tied round the limb, and the one nearest the bite tightened by twisting with a stick. Then using, if necessary, a lens, examine the part supposed to have been bitten. Usually two scratches, short cuts, or punctures, under one inch apart, will be found. Sometimes the punctures are very minute and barely visible, a drop or two of blood or serum indicating their position. The situation of the poisoned wound having been made out, free excision should at once be resorted to. The excision should include not only a portion of the skin about one and a half mehes square, but also the underlying tissues for some little depth As recommended by Wall, the areolar tissue below and around the excised portion of the skin should be dissected away freely, and on parts into which, from their situation, the fangs are able to sink in deeply, the excision should be carried still further Thus, on the fingers or toes, the soft parts should be excised down to the bone, or the finger or toe amoutated, and if the bite is on the ball of the thumb, the fascia and a portion of the muscle should be included After excision, the wound should be washed with solution of caustic potash or potassium permanganate, and the ligature removed The subsequent treatment may consist of the administration of stimulants, the employment of cold affusion, the use of artificial respiration (if there is a tendency to asphyxia), and general treatment of the symptoms as they arise. Main reliance must, however, be placed on early and free excision 2

Cattle-poisoning by snake-venom.—The cattle of villagers are occasionally criminally poisoned by skin-workers for the sake of their lides Snake-venom has been found by Hankin, in several cases, on pieces of rags taken from the rectum of dead cattle, in the United Provinces It is stated that a cobra is placed in an earthen vessel with a banana Heat is applied

Wall points out that after an incision has been made through the skin examistion of the parts below will reveal to an experienced eye if injection of venom has taken place, and that any signs of irritation indicative of the wound being something more than a mere mechanical puncture, should be taken as showing that the individual has been poisoned as well as bitten.

<sup>\*</sup> Soveral chemical substances, eg potassium permanganate, destroy the activity of sade poison if mired with it previous to its introduction into the body. These, however, only do so owing to their general action on organic matter. Hence, once the poison has been introduced into a wound, these substances, owing to their having no special affinity for the poison, are practically useless as remedial agents. So also are the so called sankstones, et stones which are reputed to have the power of sucking out the poison when applied to the wounded part

to the vessel. The snake being arritated bites the banana The banana is then taken out and crushed to a pulp which is spread on a piece of rag. The rag is inverted into the rectum of an animal by means of a piece of split brumboo. In some cases after the death of the animal snake poison can be detected on the rag by means of the test described in the following paragraph. The juice of madar (Calotrops signatura) appears occasionally to be used in a similar way instead of snake-venous.

Test for anake-venom—A small quantity of the watery solution or extract from a suspected rag, etc., sufficient to kill, should be injected into two fowls or rabbits, a different dose in each, and the same quantities mixed with antivenene, in which latter case the animals operated on should remain unaffected

## Venomous Insects.

Scorpions. These have in the last joint of the tail a hollow sting, communicating with a poison-secreting apparatus, and serving, like the poison fang in snakes, to convey venom into wounds made by it The local irritant action of the venom is always very severe Five children died from scorpion sting in Bengal during the three years ending 1872, and from cases quoted by Chevers it would appear that the sting, at any rate of the larger varieties may cause death in adults. The darker variety is said to be more deadly. Centinedes and spiders are also provided with a poison injecting apparatus connected with their jaws or mandibles The bites of these cause effects very similar to those produced by the sting of a scorpion bite of some varieties of spider appears to cause severe constitutional symptoms, and may even cause death Wasps, bees and hornets are all provided with a poison sting A single sting from one of these is not likely to cause serious effects, except in cases where it goes directly into a vein, or where inflammation and swelling of the part stung interferes with some important function, eg respiration. Taylor mentions, however, two cases in which adult females died from shock after, apparently, a single sting of respectively a wasp and a hornet A number of stings, as in cases where persons are attacked by a swarm of wasps or bees, have frequently caused severe constitutional disturbance, occasionally ending in death Lizards, contrary to the popular belief, at least those which, up to the present, have been met with in India, are not venomous

Cantharides, the dried Cantharis resicutoria, blister beetle, or 'Spanish fly,' applied to the skin, causes irritation and

vesication, and when swallowed or absorbed into the system in poisonous doses, gives rise to the usual symptoms of irritant poisoning, accompanied, when the poison has been taken by the mouth, by blistering of the mouth and throat A case of cantharides poisoning by the vapour emitted from a bottle of hairwash containing cantharidine was reported by Dr Islay B Muirhead, of London, in 1906, in which a person occupying the same room, and who did not use the wash, was affected by the fumes The evacuations usually contain blood Special symptoms in poisoning by cantharides are (a) salivation, with swelling of the salivary glands and back of the throat, rendering swallowing painful and difficult, and (b) strangury hematuria, inflammation of the genitals and other similar symptoms, due to the special irritant action of the poison on the kidneys and urinary passages In fatal cases convulsions generally precede death, insensibility may or may not be present Cantharides is seldom administered with homicidal intent, cases of poisoning by it are usually accidental or arise from its being given as an abortifacient or as an aphrodisiac As an abortifacient, cantharides often fails but sometimes succeeds, owing to the violent constitutional disturbance produced. There is no proof that the drug has any specific action on the uterus As regards aphrodisiae action the drug may possibly excite sexual passion, but it is only likely to do so when given in quantity sufficient to endanger life or cause serious symptoms Taylor 1 mentions an English case (R v. Wilkins, Liverpool Lent Assizes (1861)) where a man was tried and convicted of administering powdered cantharides to a woman, in which the question arose whether or not an offence had been committed, seeing that the drug had been given solely with the motive of exciting sexual desire Mayne, in his commentary on s 328 of the Indian Penal Code, refers to this case as follows "In a case under a similar English statute, where it appeared that the prisoner had administered a drug to a female with intent to excite her sexual passions, in order that he might have connection with her, the conviction was affirmed" Dose, etc -The medicinal dose of powdered cantharides is one to two grains, and of the tincture (strength one to eighty) five to twenty minims. The smallest fatal doses recorded are of the powder, twenty-four grains, and of the tiucture, one fluid ounce Recovery has, however, taken place from six ounces of the tincture, and in another case from sixty grains of the powder The shortest fatal period recorded is: twenty-four hours, and the longest (from one ounce of the tincture) seventeen days Taylor mentions a case where death, with the usual symptoms of cantharides poisoning,

<sup>1</sup> Poisons, p 529

resulted in five days, from the external application of cantharides ointment, in mistake for sulphur ointment, as a cure for itch. Treatment.-General Oily demulcents should be avoided, as cantharidin, the active principle, is soluble in oil Oniate injections into the bladder, onium suppositories. and warm baths should be used to relieve pain Post mortem appearances - These are usually signs of inflammation of the alimentary canal, congestion of the kidneys, and inflamination of the urmary passages When the powder has been swallowed, glittering particles of it may be found adhering to the intestinal mucous membrane Similar particles may be found in the vomited matters Detection. The powder is greyish-brown in colour, and contains shining, green metallic looking particles These resist putrefaction, and may be detected in the contents of the intestines after long periods of interment. The active principle, cantharidin, present in the powder to the extent of about one-half per cent, may be extracted therefrom, or from organic mixtures containing it, by taking advantage of the fact that it is soluble in alkaline liquids, but can be removed from these by acidulating them, and shaking them with chloroform. On separating and evaporating the chloroform canthandin may be recognized in the residue by digesting this with a few drops of oil, and applying the liquid so obtained to the skin, when, if cantharidin is present, vesication will be produced. Cantharidin is also present in the Mylabris cichoris, or Telini fly, officinal in the IP as a substitute for cantharides, and possessing exactly the same action The powder of these differs, however, from canthandes powder in containing no shining particles Cantharidin has also been found in various other Indian blistering flies, eg in the Mulabris pustulata and M punctum.

# POISONS GENERATED BY DEAD ANIMAL TISSUES

## Poisonous Animal Food.

Poisoning by Putrid Meat—An intexcettion, with spiritual more or less resembling those of poi-oning, may arise from eating meat which (1) contains ptomaines or toval-bimoses, (2) conveys a true infection by pathogenic bacteria, sciptic or from sewerage, etc., (3) is infected by gross parasites

(tape-worm, etc.), (4) is poisoned by metallic salts from imperfectly tinned cooking pots or zinc or copper vessels. It most commonly occurs from eating old preserved canned or tinned meat, and often from sausages, hence the term 'sausagepoisoning, or Botulismus, but it also occurs from other stale tinned meats, and may also occur from vegetable food 1 In the first two classes, besides the usual irritant symptoms, there is usually dryness of the skin and mucous membranes, and the narcotic symptoms of ptomaines, dilatation of the pupils, and paralysis of the upper eyelids. In cases where the symptoms do not develop for some time, but commence from 12 to 50 hours after the consumption of the tinned meat, they are due to bacteria, there is generally fever the digestive troubles are more like those of gistro enteritis, and sometimes there is blood in the evacuation and there may be pleuropneumonia, as in the Middlesbrough epidemic of 1880, in which 490 persons died, and a pneumonia bacillus was isolated Some of such mert when examined contains such a number of dead cocci and bacilli as to bear all the appearance of an artificial culture-broth A Bacillus botulinus was found by Van Ermengen in a case of food-poisoning from raw ham and a microbe like the B enteriditis of Gaertner in the Bhowanipore epidemic of 1903 by Nield Cook 2

Cheese and milk—In more than one case symptoms of irritant poisoning have been produced by eating cheese. In such cases the cheese eaten has generally, but not invariably, been found to be rancid and to contain tyrotoxicon, which is obtained as needle crystals by alkalizing and shaking with ether. It is not an alkaloid, but is considered by Vaughan to be diazobenzene and to be a product of micro-organism in the milk. In decayed cheese as well as in the milk of decased cows a poisonous ptomaine or toxiloumose has been found

Poisonous fish—Many cases, a few of them ending fatally have been reported, in which persons have been attacked with symptoms of poisoning after eating fish, especially stale or tinned fish. In some of these cases the symptoms have appeared within a few minutes, in others not until twelve or twenty-four hours, or more, after eating the fish. One or both of two sets of symptoms may be present, viz. (1) the usual symptoms of irritant poisoning, and (2) swelling and inflammation of the

<sup>&</sup>lt;sup>1</sup> An outbreak of severe distrinos in a Bengal pail was traced to the manor in the food —W J Buchanan I ws in Ind Med Gas 1000 And an attack of so called cholers in Lord Hastings camp in 1817 was attributed to numbride some rice —Chevers M J p 301 But see Bathyrism and Poisonous Tood grains — 1 Med Gas 1909 p 362

eyelds, with profuse lachrymation accompanied by irritation of the skin and appearance of an eruption resembling nettlerash. In some cases muscular debility, numbness of the limbs delirum, and come have been observed. Death has occurred within the hour, and has been delived until the nuttle day

Cases of fish poisoning may be divided into four classes .

(1) A reculiar idiosyncrasy, rendering the fish poisonous only to the individual attacked, and not to others, (2) fish usually non poisonous, becoming poisonous to all, attributed (a) to the presence in the fish of copper, (b) to the fish being in spawn, (c) to the poisonous nature of food (eq acrid mollusca, or acrid snawn or sewage) eaten by the fish, (1) to the development of a poison by decay (see "Ptomaines," below), etc. etc Cases of this kind are due to shell fish, especially mussels and oysters, but have arisen from hilsa, berrings eels, mackerel, etc. (3) Cases arising from eating fish, certain parts of which seem to be nearly always poisonous eq (a) a case cited by Birth which occurred at the Cape of Good Hope, in which two adults died within twenty minutes from eating the liver of the toad or ball bladder (diodon), and (b) a case reported by Dr Collas, of Pondicherry where three persons were poisoned by eating the Gobus crimiger, in eating which the native females take great care, in preparing them, to ramove the head and intestines, and wash the fish thoroughly (4) Putrid fish The secretion of the skin glands of certain species of amphibia has been found to be poisonous Blyth mentions that a poisonous alkaloid has been found in the skin secretions of the Salamandra maculosa, the Triton cristalus, or water salamander, and the common toad.

## Ptomaines

Ptomaines are chemical products of bacterial life in dead animal tissues, and as they are found by pest mortem decomposition, they have been called 'cadavenc alkaloids,' or ptomaines. The poisonous properties found sometimes to be possessed by certain articles of food eg milk, cheese, sausages, etc, are in many cases the result of the development of poisonous ptomaines in the food, as has been already noted. It is, therefore, quite possible that in the body of an individual, who has died from some other cause than poisoning there may on examination be found an alkaloid, which, when tested by administration to an animal, proves to be poisonous. Some of these promaines have been found to possess a physiological action similar to that possessed by certain vegitable alkaloids, eg strychnia and atropine (ptomatropine). No ptomaine, however, has as yet been discovered possessing all the exact chemical characters of vegetable alkaloids, which are capable of being identified by

Blyth Porsons, p 447

<sup>2</sup> Chevers, Med Jur , p 209

distinctive chemical reactions. Hence, the objection that an alkaloid discovered in a case of supposed poisoning may be a ptomaine produced by decomposition after death, mainly applies to cases in which the vegetable alkaloid, supposed to have been discovered, is one which can only be recognized by its physic logical action though none have yet been found to possess the poculiar tingling sensation of aconitine when applied to the tongue

### Diseased Meat.

In cases of diseased meat, the disease may or may not consist in the presence of a parasite in the meat. The parasites the presence of which in meat most commonly gives rise to cases, are the trichina spiralis and the various systicerci

Trichina spiralis.—Meat affected by this parasite contains lying among the muscular fibres small oval sacs just visible to the naked eye each containing a coiled up trichina (see Plate IV,  $I_3$ , b). Sometimes these sacs are so numerous as to give the meat a white speckled appearance. When meat thus affected is eaten without having been thogonghly cooked, a train of symptoms known as trichinesis is produced.

The pathology of trichinosis is briefly as follows the trichina, while enclosed in its cyst, is in a chrysalis condition. When the cysts are taken into the stomach or intestines of a warm blooded animal, the trichina leaves the cyst and beguing to produce young. Six to eight days after the ingestion of the cysts these young trichina beguin to leave the parent animal, and to migrate through the wall of the intestines into the muscles, where they, in their turn become encysted, and live by preying on the muscular fibre. The symptoms of trichinosis resemble to a certain extent, those of irritant poisoning differing from an ordinary irritant case chiefly as follows. (1) there is generally a considerable interval corresponding to the period of incubation

Taylor gives the measurement for the sace as  $t_0$ th of an inch long by  $\tau t_0$ th of an inch broad. The worm varies in length from  $\tau_0$ th to  $t_0$  of an inch. As many as 6000 may be found in about sixteen grains of the affected meat

A strychume like alkaloid has been obtained from a corpee (Meeke and Winner Pharm Zert). The alkaloid obtained forms white nodular crystals its hydrochloride feathery tutle. It reacts the strychines with pieros acrops a summary of the strychine with pieros and polassium dichromate sulphure and nitro scads tannin polassium fortrops gives a durty green with animom. With Probles exequent to pied first a durty violet then an olive and finally a green colour with sulphurie scad a yellow which changes to cherry red and then to rose with Erdmann reagent a yellow colour. It is only slightly bitter to the taste, and has no physiological action on frogs—Treatment 1899.

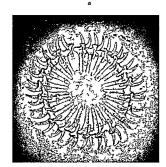
of the worm between enting the food and full development of the symptoms (2) Although the pain in trichnous is intense the vomiting and purging are not very severe and the pain is not confined to the stomach and intestines but extends to the muscles as well owing to the invasion of these by the triching (3) In trichinosis pneumonia is almost a constant symptom. there is often also peritonitis and sometimes paralysis of the muscles Several outbreaks of trichinosis have been reported chiefly in Germany the most notable being one which occurred in 1863 in which 103 persons were attacked of whom eachty died There is no remedy but it should be noted that triching are destroyed by exposure for some time to the temperature of boiling water and I ence thorough cooking of trichinous meat prevents the occurrence of trichinosis Triching are more frequently found in the flesh of the pig than in that of any other animal hence cases of trichinosis lave generally occurred from cating imperfectly cooked pig s flesh in some form or other In affected animals triel ing it is said, will always be found in tle muscles of the eve

Cysticer. These are the larve of tapeworms and may be found in the flesh of all animals. Flesh containing them is

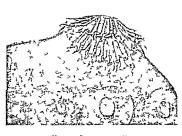
popularly termed measly eq measly pork

In affected meat the cysticerci are seen as little sacs filled with fluid embodied in the muscle. From one side of the interior of the sac a neck projects, terminating in a head surmounted with a crown of hooks (see Plate VI a and b) The pork cysticerens (C cellulose) varies in size from a pea to a large bean and develops into the Toma solium (6 to 12 feet long). The cysticerous of ox fle h is smaller in size, and develops into the T mediceanellata (15 to 20 feet or more) Both these tapeworms affect the human subject. In rare cases also the larval form of T solium has been found in the human be ly Another variety of tapeworm T el mococcus is only known to affect the dog and wolf the larval form of this tapeworm however affects other animals eq sheep in which it specially affects the brain causing staggers and the human subject giving rise to hydatid tumours Woodman and Tidy remark that echinococcous disease is alarmingly common in Iceland

Other diseased meat.—The flesh of animals affected with disease not specifically parasitic in character may also when eaten give rise to symptoms resembling those of poisoning This Dr Letheby met with a case in London in which suct four persons of whom one died were attacked with sickness diarrhea and great prostration of strength after eating



HOORLETS OF CYSTICEBULS × 63



HEAD OF CISTICERCUS × 63 (From Micro-Pi otographs by Dr II G bles )

[To face p 608

sausages made from diseased beef. In another English case, which occurred at Welbeck, in 1880, over sevently persons, of whom four died, were attracked with similar symptoms after eating him found, on examination, to contain a braillus. In the great majority of the Welbeck cases of which particulars could be obtained, the symptoms did not appear until twelve hours or more after eating the affected food. A bacteriological examination should be made in such cases.

## CHAPTER XXVIII

## NERVE POISONS.

These may for descriptive purposes be divided into cerebral spinal, cerebro spinal, cardiac, etc. (see Table, p. 448)

# Cerebral Poisons, Opium, etc.

Generally the posons of this order, including narcotics, an esthetics, inchraints and deliriants act mainly on the brain, causing one or other of two sets of symptoms or both. These, in the order of their occurrence are (1) Excitement with quick pulse and flushing of the face, often accompanied by delirium, and more or less derangement of voluntary movement, and (2) Sopor, deepening into more or less profound coma, with laboured and stertorous breathing

The mydriatic deliriants produce the first of these two sets of symptoms accompanied by dilatation of the pupils, as their prominent effect. The majority of poisons of this ordernarcotic poisons-produce the second set of symptoms as their prominent effect. In poisoning by some of these, eg alcohol, a first stage of excitement and delirium usually precedes the second or comatose stage, but when the dose is large, this first stage may be absent. In others, eg opium, the first stage is commonly absent, or only slightly marked, but, if the dose is small, or the patient habituated to the action of the poison, a well marked first stage may be present. A few, eg hydrocyanic acid and the porsonous cyanides, act with extreme rapidity, paralyzing the heart if the dose is large and causing death by syncope, or in smaller doses, acting on the spinal cord as well as the brain and although producing insensibility, quickly causing death by asphyxia due to paralysis of the muscles of respiration, and not by come as is usual in cerebral poisoning.

No chemical antidote is available for the majority of these poisons, hence, in most cases the treatment must consist in the use of measures directed to (a) procuring chimination of the poison, and (b) counteracting its effects. If the poison, as is usually the case, has been administered by the mouth, the first of these indications may be carried out by giving emetics or using the stomach-pump, the latter being resorted to in preference to repetition of the emetic, seeing that many of these, eq zinc sulphate, if not ejected by vomiting, are hable to become absorbed and act as poisons. The measures by which the second indication of treatment may be carried out vary according to the poison and the prominent symptoms, Thus, cold effusions, keeping the patient roused, sinapisms, etc. are indicated when parcotism has to be overcome; and galvanism and artificial respiration when death threatens to occur by asphyvia In the case of some cerebral poisons, special physiological antidotes are indicated, eq. atropia in opium poisoning

# Opium and Morphine.

Opium, Afim Afiyun (Hind), is the inspissated juice obtained by incision from the unripe capsules of the poppy, Paparer sommiferum, NO Papareracew It

contains meconic acid and a number of alkaloids, those present in largest quantity being narcotine and morphine

Indian opium, as a rule, contains more narcotine than morphine Other varieties, as a rule, contain more morphine than narcotine Of these two alka loids, narcotine has no narcotic properties, and is officinal I P as a tonic and antiperiodic Morphine, on the other hand, is a powerful narcotic The per centage of morphine in different samples of opium varies from about 21 to 15 or even 20 per cent Indian opium often contains under 5, and seldom contains over 9 per cent of morphine Other alka loids present in opium eg codeine, narceine, and papaverine, also possesses narcotic properties Another alkaloid, thebaia, the proportion of which in opium varies, seldom, however, exceeding 1 per cent, is a convulsant



like strychnia, but less powerful

Opium is so easify obtained everywhere in India and by its means the 'thin spun life' can be slit with such ease and freedom from physical suffering that, after strangulation, it is the most favourite means of suicide. In suicidal cases the opium is often mixed with mustard-oil in the belief that the latter facilitates the speedy action of the opium

Of cases of poisoning in India, nearly 40 per cent, of the deaths reported to the chemical examiners are due to opium Such cases in adults are, as a rule, suicidal, and these are mainly amongst women chiefly mustresses or dem monde deserted by their lovers though a considerable number are 'failed' students Homicude for the reasons already given is rather rare by opium. In very young children suicide is of course ex cluded and cases are either accidental or homicudal. The practice of drugging young children with opium by ayahs and nurses in order to keep them quiet is widely prevalent in India and often results in cases of the first description. So also but less directly does the habit of opium eating cases being often reported in which children getting hold of the box in which the opium is kept by their parents eat a quantity and die. Possoning by opium is a somewhat common method of infantiacide in India.<sup>3</sup>

in England according to statust es collected by Blyth in the frevents en ling 1850 altogether 1.031 deaths were reported from posion. Of these 644 or 40 7 per cent were due to opiates. Of the 643 deaths 160 occurred in infants two of these were cases of homizade. Of the first a lait cases none were homicaded and about 27 per cent smooths. In England drugging with opium is occasionally adopted for the purpose of facilitating robberty it is called in ever used for this purpose in India its place being taken by datums.

Symptoms - When solid onium has been swallowed there is usually an interval of half an hour to an hour before the symptoms appear A shorter interval than this is sometimes observed especially when the drug has been taken in solution on a nearly empty stomach. In other cases, the interval has been several hours in duration Intoxication appears frequently to delay the appearance of the symptoms, but in one exceptional case reported by Christison the appearance of the symptoms was delayed for eighteen hours without any apparent cause. At first there may be slight excitement this liowever is soon followed by guddiness and drowsiness succeeded by sopor gradually deepening into coma with low stertorous respiration The breathing gets more and more shallow and finally death occurs usually from paralysis of the respiratory muscles face is usually pale the lips livid and the skin bathed in perspiration All the secretions (that of the skin excepted) are more or less completely suspended The pulse may be at first natural or quickened, afterwards it is usually slow but becomes small quick and irregular as death approaches. An ohour of uprom may be present in the breath. The pupils are contracted and insensible to light but towards the end become widely dilated

<sup>1</sup> Beng Medico-legal Rept for 1870- 2 states that in the three years ending 187° thirty cases of infanticide by opium poisoning were reported and in add t on thirty series cases of alleged infant de by polion of which the impority were probably opium cases. For recent statistics see Appendix IX.

Rere symptoms — Vomiting and even distribute are sometimes present. Tetanoid convulsions and locking have been observed, more particularly in cilidren, and when morphine has been taken. Guy also includes delirium, amesthesia and paralysis, as occasional symptoms. In rare cases the symptoms assume a restition form, the patient, after several hours' insensibility, recovering Constitutions, but relapsing after an interval into coma, terminating fatally (see following case)

Case — Case of the Hon Mrs Anson—"This lady swallowed, while fasting, an onnee and a half of laudanum by mistake. In a quarter of an hour emetics were given, but she did not voint for half an hour, and she was not treated medically for two hours and a half. The matter then drawn from the stomach had no smell of laudanum. She was quite unconscious, and had lost the power of swallowing. After remaining in this comatose state for upwards of nine hours the patient revived her face became natural, the pulse steady, the power of swallowing returned she was able to recognize her daughters, and in a thick voice to give an account of the mistake she had made. This state lasted about five minutes, the torpor then returned, she again sank into profound come, and deed in fourteen hours after the posson had been taken?

Unusual modes of administration.—A case is reported of death from application of a poultice to the abdomen containing about one onnee of laudanum <sup>1</sup> Serious symptoms have arisen from the application of opium to a wound. Death has occurred from the application of morphine to a wound, also from hypodermic injection of morphine, and from the injection of an enema of opium into the rectum. The infroduction of opium into the vagina may cause death, and is a not uncommon method of attempting succide in some parts of India.

Case — Opuum possenng, homacdal, mchildren — In 1889 the mother of a female child about two months old left her child in the verandah of her house in Sitimari, while she went to fetch water. On returning hes found the child sucking the finger of a woman who had come during her absence. This woman, on being asked what she was doing hastly wiped her right hand in a piece of rag and told the mother that she was giving the child some "bread" a piece of which she showed in her left hand. The woman then left, and the child some commenced vomiting and laid within a law hours. Opuum was detected in the insecre of the halo sound to been stains of opuum. The bread which the accurach held in the left hand contained no opium. The mother wiped the mouth of the child, when it womated with a piece of cloth which was also for warded for examination, and in the stains on which opium was detected.—L. A. Waldell, Beng Ohem Ex Rept, 1899.

Case —The cavil surgeon of Patan forwarded the viscera of a Hindu male child, aged about sur months, who was said to have met his death under the following circumstances, as reported by the police — The relatives of the deceased stated that the mother of the deceased was nursing another child, the mother of the latter child took the deceased on her laps and went out, when the deceased began to cy — The mother

<sup>&#</sup>x27; Tardieu, quoted by Blyth, p 268

of the deceased suspecting something wrong took her chill from the woman and brought it home but the child ded within a few hours Opium was detected in the viscen of the child Both of these cases occurred in the districts where opium is cultivated in 1 pper Bengal.— LA Waddell Beng Clem Tr. Rept. 150:

Give—Op um pouson ng with cut threat—Sue lal—In 189° in Calcantia a Jew was found lying dead in his room with a deep suicidal cut on the threat. The stomach was forwarded for analysis and found to contain lumps of solid oplum. Deth resulted from his morthage by opening of the wind pipe and large blood vessels on both a dea of the neck, but the presence of the large quantity of o; um in the stomach undcated that the man was a determined suicide. Deceased ev dentil took opium first but finding life still prolonged had recourse to the king to hasten his end. Obviously in cases of this description there is no opium cdour in the breath—In A. Waddell Blenc Chem. Ex. Rept. 1897.

Cate —Po soning by applying on um to a wound —A Brimman boy was struck on the forebead, cans ga a gap ag wound about an inch long. This the parents about three hours after stoffed with about forty five grains of opi im. On the third day he was brought to a mod call man (Dr. II. V. Jones) in a semi-comatose state but recovered under actine treat ment—Chavers Med Jr. p. 288.

Diagnosis -1 From apoplexy Here the chief points of distinction are (a) The age and appearance of the patient Apoplexy generally but not invariably attacks the old and it is more common in fat than in thin persons (b) The history of In apoplexy the symptoms as a rule come on abruptly in opium poisoning they advance gradually (c) The state of the pupils In apoplexy the pupils are dilated except in apopleyy of the pons varolii when they are contracted In opium poisoning the pupils are contracted except towards the end of the case when they become dilated. (d) The odour of opium in the breath. This however may be absent in opium poisoning (c) Convulsions a bloated face and impossibility of rousing the patient are all more in favour of all oplexy than in favour of opium poisoning 2 From ur emic coma -Here chief reliance would be placed on (a) the history of the case (b) the presence in or absence from the urine of matters indicative of disease of the urmary organs (c) the state of the pupils con traction pointing to opium poisonin, and (d) the presence or absence of an odour of of um in the breath 3 From other narcotic poisoning -Alcoholic poi oning is sometimes difficult to distinguish from opium poisoning. In the first the pupils are usually dilated but may be contracted, and there is often an odour of alcohol and not of opium in the breath poisoning by carbolic acid the pupils as in opium poisoning are contracted here however the local action of the poison on the lining membrane of the mouth would most probaily serve to distinguish the case Contracted pupils also are present in poisoning by Calabar bean may be present in acouste poisoning

and also except during the fits when the pupils are usually dilated in poisoning by strychnia The three poisons last mentioned however, are not nucotic in action

Fatal dose This is affected by -1 Age -Children are extremely sensitive to the action of this drug 2 Habit -Persons in the habit of taking opium or its preparations acquire a resisting power to its action eg a case is on record of an opium eater who was in the habit of swallowing nine ounces of laudanum (tincture of opium) daily and another of a lady aged twenty six, who took ten grains of acetate of morphine three times a day for ten years 3 Disease—In some diseases eg tetanus and diseases accompanied by severe pain large quantities of opium are tolerated In other affections eg Bright's disease, comparatively small doses may produce serious effects 4 Idio syncrasy -Some persons are easily affected by small doses of opium, others are but little affected by large doses 5 Quality of the drug —As already pointed out the percentage of morphine in opium varies greatly Garrod however remarks that although good opium contains one tenth of its weight of morphine morphine is not ten times but only about four times as strong as opium Hence although ordinary Indian opium probably as a rule contains only one fourth to one half as much morphine as BP medicinal opium it does not necessarily follow that the latter is from two to four times as strong as the former

Fatal dose for children -Death has been caused in an infint five days old by two drops of tincture in another nine months old by four drops of tincture and in a third case one grain of Dover's powder equal to one tenth of a grain of opium nearly killed a child four months old (Taylor 1) For adults -In the case of these the smallest fital doses recorded are two and a half grains of extract equal to four grains of crude opium (Taylor 2) and four and a half grains of opium taken along with nine grains of camphor (Christison 3) Christison also mentions three cases in which elderly persons suffering from respectively (1) severe catarrh (2) cough and (3) asthma died from doses equal to less than four grains of opium In one of these cases the fatal dose was twenty five drops of the tincture and in another fifteen drops of Battley's solution The case just mentioned excepted the smallest fatal dose of the tincture on record appears to be two drachms Blyth however points out that the tincture as usually sold in England varies greatly in strength Recovery has been recorded from very large doses

of onum Woodman and Tidy consider that four grains of opium (presumably English medicinal) would in most cases prove a poisonous dose.

Fatal period. - Shortest recorded, forty-five minutes Usual period nine to ten hours, in rare cases, two to three days. The prognosis is favourable if the patient survives twenty-four hours

Treatment -If the poison has been introduced into a wound etc., remove it as far as possible and wash out the part If it has been swallowed, wash out the stomach well by the stomach pump if the latter is not available then give an emetic or inject apomorphine hypodermically Endervour to rouse patient and keep him roused by cold affusion sinapisms and flicking with a wet towel, and in severe cases the faradic current. In the less severe cases a cold douche and walking the patient about may be sufficient, but the forced perambu lation should never be done where the surface of body is cold or where coma is present. For profound coma artificial respira tion should be tried along with electricity Administer hot strong infusion of coffee freely if the patient can swallow, also give a smiff of smelling salts. As a chemical antidote permanganate of potassium has been advocated by Moor and his success confirmed by many others. Dr Maynard having used it successfully in nineteen cases in India.3

Moor recommends 10 to 15 grains of potassium permanganate dissolved in 3 to 8 ounces of water to be repeated every halfhour for three or four times If crude opium or the uncombined alkaloid has been taken, the solution of permanganate is to be acidulated with a little sulphuric acid. One crain of permanganate in one ounce of water he recommends should be given for each grain of morphine or every 10 grains of opium taken Luff found that on mixing 3 grains of scetate of morphine with comit and then treating the mixture with 4 grains of permanganate dissolved in 4 ounces of water, no morphine could be extracted from it, and he recommends that the stomach should be washed out at intervals with a weak solution of permanganate to oxidize any of the poson which may be excreted into it The permanganate should not be used in concentrated solution, as it may corrode

Atropane introduced hypodermically has been used as a

<sup>1</sup> For Med , p 371 \* Medical Rec 1894 also Permangangte Treatment of Opium Poisoning London, 1899 Brit. Med Jour, May 16 1896

physiological antidote to stimulate the respiratory centres, but its utility is somewhat doubtful. One twentieth of a grain is injected and may be repeated till pupils dilate. The following cases show that in opium-poisoning very large doses of atropine are tolerated. This, to a certain extent, supports the theory that atropine is a physiological antidote for opium.

In 4¹ years ending November, 1883, 64 adults pousoned by opum were treated in the Jamsetjee Jesjeebhoy Hospital, Bombay, by hypo derme injection of atropine in ½ grain doves, repeated at intervals, until dilatation of the pupils occurred. Of the 64, 64 ded and 33 recovered to the 54, 64 ded and 53 recovered of the 54 who died, 7 had been under 2, 11 over 2 and under 6, 8 over 6 and under 20, and 5 over 20 hours in hospital. The amount of atropine injected in the fatal cases was, in 9 a ½ of a grain, in 10 over ½, but not more than ½ of a grain, in 8 over ½ and under 1½ grains, and 14 over ½ grains. The amount injected in the 58 cases of recovery was, in 12 ½ of a grain, in 12 more over ½ to 2 of a grain, and in 9 from over ½ to 1½ grains.

Strychnine as well as ether hypodermically are useful

Post mortem appearances.—Not characteristic. McLeod summarizes them as follows in well-marked cases.—"Brain turgid, lungs congested, the head distended with liquid blood, liver and spleen engorged, mucous membrane of the stomach either natural or slightly and uniformly injected '1

Dium eating, etc.—The habit of opium eating widely prevails in Indir Very generally the crude drug is used Sometimes, however, as in Rajputana, a watery decoction, known as 'kusoomba,' or 'Umal' is employed. Opium smoking is also much practised, a watery extract of the drug called 'chandul' being commonly used for this purpose The question whether opium eating, smoking, etc., is or is not injurious to health has been hotly debated. There appears, however, to be a pretty general consensus of opinion among medical men who have actually practised their profession in countries where these habits

<sup>1</sup> Beng Med Rept., 1869 p. 100
<sup>2</sup> Col Todd frequently sludes to it in his Rajasthan. The act of esting opum together was the form by which the rival claim became reconciled, and personal frendships were declared. "Until lar Khana"—to est opium together—is the most involable piedge, and an agreement ratified by this scenmony is stronger adjuration. If a Rajapi pays a visit, the first question is "Until Khyal"—i 'liave you had your opiate? "'Until Khyal"—i'liave you had your opiate? "'Until Khyal"—i'liave you had your opiate? "'Until Khyal"—i'liave jou had your opiate? "'Until Khyal"—i'liave jou had your opiate? "'Until Khyal"—i'liave jou had had been to had been a supplied to the representation of the property of

prevail that, used in moderation opium neither tends to injure health nor to shorten life. Abuse of opium, like abuse of alcohol, may cause derangement of digestron and general impatiment of health. Abuse of opium, however, is much less likely than abuse of alcohol to injure health, and appears to be much less common among opium enters smokers, etc., than abuse of alcohol is among alcohol drinkers. In persons accustomed to the use of opium, the preliminary stage of excitement, slight or absent in cases of poisoning is a marked effect of a moderate dose. Chevers gives a case where a man, presumbly an opium enter, previous to committing murder, swallowed, apparently to merve liminself for the deed, so large a quantity of opium that he died a five hours after committing the crime, see following case. For the question of oriminal responsibility in such cases, see p. 383, also Alcohol.

On animals—It has been found that large quantities of opum may be given by the mouth to pigeons and other birds, without narcotism being caused. Blyth remarks that the explanation of this is that the poison is not absorbed as sub-cutaineous injection of morphine has been found to act rapidly on all birds hitherto experimented on. In frogs, opinin excites tetanus followed by paralysis of reflex action.

Preparations of opium—Of the stronger BP and IP preparations the following quantities correspond to about one grain of opium—Extraction opii, \$\frac{1}{2}\$ to \$\frac{1}{2}\$ grain, \$pildis saponts comp, \$\frac{1}{2}\$ grains pill plumbic cum opio \$\frac{1}{2}\$ grains, pillers species comp (Dovers powder) pulses opi comp and emplastrom opii, 10 grains, unquentiun gallic cum opio, about 13\frac{1}{2}\$ grains, tincture opii (laudanium) 14\frac{1}{2}\$ minims \textitizet opii (laudanium) 14\frac{1}{2}\$ minims \textitizet opii (laudanium) 14\frac{1}{2}\$ minims \textitizet opii (laudanium) also contain opium, among these may be mentioned black drop an acetto acid solution of opium about four times as strong as the functure \textitizet Balllys liquid opii scalativus has about the same strengths as extractum opiu (laudanium, \textitizet Preparation) and \textitizet Appendix a nearly colourless alcoholic solution of opium, has about the same strength as laudanium \textitizet Galler's cordial, used as a

<sup>&</sup>lt;sup>1</sup> Five to hit drops of the linetime equal about ten minums. The liquid extract and the wine of optima are prepared from extractime gos, ione conce to the pint) while the functure is prepared from dry optima an conce and a half to the pint. One grant of optim is contained also in the following quantities of other BT and LT preparations—Fifteen grains suppositoric plants competits twently grains print know or, wently nine minume insuredness of the property of the propert

sedative for children, contains one grain and a half of opium per fluid ounce. Other opiate preparations, used for the same purpose, are Mrs. Winslow's Southing-syrup and Dalby's Carminative. The first contains about one grain of morphine, with other opium alkaloids, per ounce, and the second, about one-sixth of a grain of opium per ounce.

Morphine or morphia. The symptoms, etc., in poisoning by this alkaloid, or one of its salts, are similar to those of poisoning by opium, except that convulsions are apparently oftener present. The alkaloid itself is only very sparingly soluble in water, and is not officinal. The two salts of morphine most commonly employed both of which are officinal, B.P. and I.P., are the acetate and the hydrochlorate Both these are much more soluble in water than morphine, the hydrochlorate being soluble in about sixteen parts of cold water, and less of boiling water, and the acetate more soluble than the hydrochlorate. The medicinal dose of either salt is one eighth to half a grain. One grain of either may be regarded as a minimum fatal dose for an adult The I P. contains the following preparations of these salts -Of the acetate, a solution, strength four grains to the fluid ounce, of the hydrochlorate, a solution of the same strength, also suppositories, half a grain in each, and lozenges, one thirty sixth of a grun in each. The morphine habit is not uncommon in the larger cities, and in Burma a widely popular brand of pills for ' the cure of opium eating" was found to contain morphine. The Burma-Chemical Examiner in 1898 reported that in 51 cases analyzed morphine was detected in the substances examined, and the use of these pills had now extended throughout Lower Burma and as far as Mandalay Those consumed in the Arakan division were usually made locally, while those used elsewhere in Burma were apparently of Chinese manufacture.

Chlorodyne contains morphine as its chief active ingredient, and some cough lozenges have proved poisonous on account of the chlorodyne used in their manufacture. According to Blyth, Brown's chlorodyne contains in each fluid ounce of the mixture about seven grains of hydrochlorate of morphine, six drachms of chloroform, and 104 drops of Scheele's prussic acid, and 53 minims of tincture of Indian hemp. In poisoning by chlorodyne the pupil has been observed to be dilated, doubtless due, as

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suggested by Professor Powell, to the symptoms of prussic acid poisoning preceding and overshadowing those due to morphine. Treatment—Should keep in view of these constituents of this mixture. In a case reported by Dr Hughes the pupils were fixedly dilated slightly, and lips cyanosed—Lither and strychnia were given, but respirations ceased—Artificial respiration was kept up for three hours, procuring shallow breathing till death some hours after by cardaga failure—

Proppy capsules, Pot (Hind.), '(see Fig 51), are narcotic 'propis capsules in Fig. 2 and IP, prepared from the capsules freed from the seeds, is said to have a strength equal to about two grains of opium per fluid owner. The BP and IP also contain an extract prepared from the same, the medicinal dose of which is two to five grains. Poppy oil, expressed from the seeds, Kash-kach-kat tel (Hind.) is used largely in India in food and appears to be mert. Another oil met with in India under the name of poppy oil, unlike poppy-seed oil is dark brown in colour, and has a strong odour of opium. It appears to be a vegetable oil which has been used for softening old opium, it is employed as an anodyne application, but I have not been able to detect either morphine or micconic acid in the specimens I have examined.

Detection - Meconic acid in solution gives, with ferric chloride solution, a blood red colour, not destroyed by dilute hydrochloric acid (distinction from acctates), and not destroyed by mercuric chloride solution (distinction from sulphocyanic acid) Morphine in solution gives (1) with strong nitric acid, an orange colour changing to yellow, (2) with a mixture of bickromate of potassium solution and strong sulphuric acid, a green colour, and (3) with a mixture of starch solution and solution of rodic acid a blue colour. In solid form morphine sublimes at 330° F without change of colour, it melts at 340° and darkens with deposit of carbon, whereas strychnine sublimes at 345°, melts at 430° when it darkens from deposited carbon, tartar emetic sublimes slowly at 480°, and chars at 550°, whilst arsenious anhydride calomel and corrosive sublimate sublime without change of form or colour at 260°, 240°, 200° respectively

From organic muxtures, meconic acid and morphine may be separated as follows —Digest solid matters cut up into small pieces (or fluid matters concentrated on a water bath to a syrup) with alcohol acidulated with acetic acid strain through cloth

<sup>1</sup> Morphine is only very sparingly soluble in other and chloroform.

evaporate the alcoholic tincture nearly to dryness on a water bath, add a little water and a few drops of acetic acid, and To the filtrate add excess of sub acetate of lead solution and boil, filter again, the filtrate will now contain the

morphine as acetate, and the precipitate the meconic acid as meconate of lead These are to be separately treated as follows -(1) The precipitate is to be suspended in water, sulphbretted hydrogen passed through the liquid, the liquid filtered, evaporated to a small bulk, and tested for meconic acid, (2) The morphine filtrate sulphuretted hydrogen is passed through this until all the lead is thrown down, the liquid is then filtered and concentrated, and morphine extracted from it as in the Stas Otto process (see p 545), using amy lie alcohol as a solvent As an aid to diagnosis in a case of poison ing, the ferric chloride test for meconic acid may be applied directly to a small portion of the liquid removed by the Microscopically stomach - pump evaporating spontaneously the morphine extract with a drop of dilute sulphuric acid on a glass slide, crystals of morphine sulphate will be obtained as in Fig. 53

Autenreith recommends the following method of carrying out the meconic test To the watery liquid left after extraction of alkaloids by the Stas Otto process add some calcined magnesia and boil for about three minutes Filter, and acidulate the filtrate with dilute hydrochloric acid On then adding a drop of ferric chloride ganic) and noting the tem solution a reddish brown colour develops If, as frequently happens, the liquid is already of a dark-brown colour, it must be diluted with water until fairly transparent before addition of the ferric chloride Extracts of certain grains used as food in India in which is received the when treated by the above method give a



Apparatus for testing poisons (inorganic and or perature at which change of form and colour and sublimation occur show ing the spirit-lamp ap plied to the substance placed on the disc of cop per with hellow nipple thermometer

Fig 50 Sublimation -

brown colour which sometimes is not dissimilar from that given by extracts containing opium Indian opium (but not Turkey opium) contains a substance that gives a rose-red colour when boiled with hydrochloric acid In carrying out the Stas-Otto

test this substance does not pass to any great degree into the and ether extract as does a similar pink colour producing substance formed in the growth of cholers, B Cots, and other microbes. It passes into the alkaline ether extract. A few cc. of half per cent acctic acid are added to this ether extract. The ether is evaporated off. The residual liquid gives a pink colour when heated with a few drops of dilute hydrochloric and. On filtering the coloured liquid the colour remains attached to the filter paper, a fact that is sometimes of use when brown colouring matters are present. This test is known as the porphyroxin test. Occasionally different kinds of grain and flour give a pink colour when bolled with hydrochloric and Further research is required to decide whether, as is



Fig. 53 — Morphine Sulphate × 100 Obtained by evaporation spontaneously with dilute sulphuric acid.

probable, the pink colour producing substance in hese cases is one that passes into the acid ethereal extract.

Failure to detect, etc.—The detection of optim depends on the recognition of morphine and meconic scid, tive substances which form only a fractional part of the crude drug. A very minute dose of optim, however, containing only an infinitesimal quantity of these substances will prove fatal to a young child. In such cases analysis often fails to detect the presence of the poson. Cases also have often occurred in which adults have died from the effects of a considerable dose of optim, and yet it has been found impossible to detect the poson after death in the viscora. Among other cases of this kind, Taylor mentions one of a young woman who died in nine hours from a dose of

one and a half ounces of laudanum and yet in the contents of whose stomach after death, no trace either of meconic acid or morphine could be detected On the other hand, opium has several times been detected in the contents of the stomach of persons poisoned by it, four months or more after death explanation of these differences is probably something as follows When an individual has lived for some time after swallowing the poison especially in solution, such portion as has not been got rid of by vomiting becomes absorbed and distributed through the body, its constituents after absorption either undergoing change or becoming so very widely distributed that unless a very large portion of the body is submitted to analysis, a sufficient quantity of them for identification cannot be isolated On the other hand if the poison has been taken in the solid form, or death has been rapid, a portion of it, failing to undergo absorption before death, remains in the stomach, and as opium has a considerable resisting power to putrefaction, its presence may still be detected even if this is far advanced Finally, it may be pointed out, that the presence of realgar as an adulterant in opium (see p 505), might lead to complications of evidence in a case of opium poisoning

#### Alcohol.

Alcoholic poisoning is not very common in India except in the larger cities as alcoholic liquors are forbidden to Mohammedans and seldom indulged in by Hindus of the better classes

Alcohol.—Water free or 'absolute' alcohol is seldom met with Rectified spirit the nearest approach to it in common use, contains 15 per cent by weight of water. The quantity of real alcohol in liquors sold for potable use is approximately in strong spirits such as brandy whisky, rum, arrack; gm. ct. 37 to 45 per cent , in strong wines such as port and sherry, 15 to 22 per cent , in light wines, eg. claret or hock, 6 to 9 per cent, and in malt liquors such as porter and ale, 3 to 6½ per cent. Proof spirit (in terms of percentage of which the strength of alcoholic liquors is often stated) contains 49 24 per cent. by weight of absolute alcohol

Acute alcoholic poisoning may arise from the inhalation of alcoholic vapours, as well as from swallowing alcoholic higuids. There is usually a previous stage of excitement and delirimm. This is followed by stupor deepening into coma with steriorous breathing. The face is usually flushed the breath smells of alcohol, and the pupils are generally but not always dilated. As a rule the patient can be temporarily roused into partial

sensibility by a loud noise or violent shock. Vomiting and vocasionals symptoms. Occasionally also the symptoms remut, the patient recovers consciousness, but subsequently dies from failure of the respiration

Diagnosis of alcoholic poisoning from concussion of the brain apoplexy, and poisoning by other narcotics, eg opium, is sometimes a difficult matter. In these the face is usually pale, and in opium poisoning the pupils are contracted. A smell of alcohol in the breath, it must be recollected, merely indicates the presence of alcohol in the stomach, accompanying narcotic symptoms may, or may not, be due to alcohol poisoning

Fatal dose, etc.—In terms of absolute alcohol, the probable minimum fatal dose is —For a child under twelve, 1 to 2 onnees, for an adult 2½ to 5 onnees. Recovery has been recorded in an adult after swallowing a quart of whisky (probably equal to 1 tests 9 onnees of absolute alcohol), and in a child of five after swallowing 3 ounces of rmm (probably equal to 1 to 14 ounces absolute alcohol). In alcohol poison ing death obviously may occur as an indirect result, as, for example from a fall or other accident brought about by intoxication. After coma has supervened death may occur in a few minutes or not for days. Blyth states that death has occurred after come of three, four or even six days' duration.

Treatment—The contents of the stomach should be at once evacuated, preferably by the stomach pump and endeavours should be made to restore sensibility by cold affusion, galvanism ammonia to the nostrils, etc. Strong coffee may be administered as in opium poisoning. Acute alcoholism in robust and otherwise healthy subjects may be treated by large doses of digitalis, but the perils of this treatment are obvious and its value doubtful.

Post mortom appearances.—The nucous membrane of the stomach generally but not always, shows agms of milam mation. These vary from patches of redness to a condition similar to that found in poisoning by a powerful non-corresive irritant. The brain is usually conquested, so also frequently are the lungs, and the large vessels of the chest are usually found full of dark fluid blood. An odour of alcohol is usually present in the contents of the stomach, and may be noticeable also in other parts of the body.

Chronic Alcoholic poisoning.—Long continued abuse of alcoholic liquors may, as is well known, give rise to disease of yarious organs, and to delirium tremens Delirium tremens

may be distinguished from intoxication by the history of the case and the character of the delirium. This may be shortly described as a delirium of dread, accompanied by delusions most commonly connected with visual perception. The patient imagines he sees various objects lying around him, or crawling about, and is often violent, with a tendency to suicide, or less commonly to homicide As a rule he can be roused into temporary sanity when sharply spoken to Legally, delirium tremens is unsoundness of mind.1 not intoxication

The criminal responsibility of individuals for acts done while in a state of alcoholic or other intoxication a is dealt with in se 85 and 86 of the Indian Penal Code Section 86 is as follows -- In cases where an act done is not an offince unless done with a particular knowledge or intent, a person who does the act in a state of intoxication shall be liable to be dealt with as if he had the same knowledge as he would have had if he had not been intoxicated, unless the thing which intoxicated him was administered to him without his knowledge or against his will '

Mayne, in commenting on this section, writes "Sometimes in determining the quality of an offence, evidence is necessary of a specific existing state of mind, which must be found as a fact, and cannot be assumed For instance, supposing a fatal blow to be struck under circumstances of grievous provocation. it might be shown that, notwithstanding the provocation the defendant had acted, not under its influence, but from a preconceived malicious resolve to kill If so, the offence would be murder But the mere fact of the deadly blow would not be sufficient evidence for that purpose Given the provocation. the legal inference derivable from the character of the blow would be exhausted in making the act be culpable homicide not amounting to murder Evidence of a different state of mind would be required to constitute the grayer charge this state of things, intoxication might be an answer to the charge of murder

Methyl Alcohol, Wood Alcohol, Wood Spirit, Wood-Naphtha or Pyroxylic spirit, obtained by the destructive dis tillation of wood, has an action on the system similar to that of ethyl alcohol. It has a peculiarly disagreeable odour, and is used for fouling rectified spirit so as to render it

cating agent is

<sup>1</sup> For the criminal responsibility of persons of unsound mind see In \* The responsibility is the same no matter what the nature of the intoxi

non drinkable Thus rectified spirit mixed with ten per cent. of pyroxylic spirit is sold under the name of 'methylated spirit for use in arts and manufactures let, despite its neuseous odour and taste this methylated spirit is not un frequently consumet by drinkards, and its wholesal use as a substitute for whisky on the passing of the laws in the United States of America prohibiting the sale of intoxicating liquors caused in a few weeks in December 1919 over a bundred deaths in New York and other United States towns with several thousands of cases of blindness, paralysis and convulsions.

Symptoms —Blindness followed the drinking of 4 ounce sometimes and death after 14 to 34 ounces. The poissions effects are most marked on the eyes causing either temporary rible niness or in severe cases atrophy of the optic nerves result (probably drinanent blindness). It also causes heart failure

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etection—(a) All three alcohols are inflammable and ne of in the pale blue flame addition.

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The converse is not the case, as a few other substances besides alcohol give the reaction

\( \square\) (d) All three, if added to a mixture of bichromate of
potash solution and strong sulphuric acid, change the colour of
\( \square\)

the mixture from red to green

(\*) Methyl and ethyl alcohols are both miscible with water Methyl alcohol has a peculiarly disagreeable odour Ethyl alcohol has a pleasant odour, and, when heated with sulphurne acid and an acetate, gives vapours of acetic ether, the odour of which is peculiar and characteristic Amyl alcohol is not miscible with water, treated as above, it evolves amyl acetate, which has the characteristic odour of jargonelle pears

From organic mixtures methyl and ethyl alcohols may be readily separated by distillation. The liquid to be distilled, if acid, should first be neutrilized. Methyl alcohol on account of its superior volatility, should be looked for in the first portions of the distillate. From the distillates the alcohols may be obtained, sufficiently free from water for recognition, by shaking with solid potassic curbonate. The liquid will then separate into two layers of which the upper one contains the alcohols. Amyl alcohol, the boiling point of which is 132° C,

will be found either in the last portions of the distillate or in

the residue in the retort. From the latter it may be removed by shaking with ether, in which it is soluble

Ether, Sulphuric Ether or Ethyl oxide—This, when swallowed, produces effects similar to those produced by alcohol it appears to be more rapid and more powerful in its action than alcohol but its effects pass off more quickly. Big the estimates that one fluid onnee swallowed would kill most adults It is sometimes taken by spirit-drinkers, as a substitute for whisky, brandy, etc. Ether vapour, if inhaled, produces effects similar to those produced by inhalation of chloroform vapour, but is said to be less likely to cause arrest of the heart's action Inhalation of ether vapour has however, caused detth. A given quantity of ether acts more powerfully when inhaled in the form of vapour than when swillowed in the liquid form.

Amyl Nitrate.—Inhalation of the vapour of this is employed for the purpose of relaxing vascular spasm. When inhaled, its first effect is to cause dishing of the face, throbbing of he carotids a quick full pulse, and giddiness. Experiments in animals show that large doses of the vapour causo conductions on an animal show that large doses of the vapour causo conductions of the vapour causo conductions of the vapour causo conductions.

## Chloroform

Chloroform, when swallowed produces effects very similar to those produced by alcohol causing if taken in sufficient quantity come with stertorous breathing and dilated pupils As in alcohol poisoning vonnting and convulsions are occasionally present. Taylor mentions a case in which an adult who had swallowed three ounces recovered sensibility in fourteen hours but died of acute gastritis with collapse twenty nine hours after swallowing the poison. The smallest dose of liquid chloroform which has proved fatal to an adult is 3.8 drachms a case of recovery however is reported after swallowing four ounces One drachm proved fatal in three hours to a boy at four A given quantity of chloroform acts very much more powerfully when inhaled in the form of vapour than when swallowed in the liquid condition Inhalation of chloroform vapour causes (1) a stage of excitement with flushing of the face and contracted pupils in this stage delinium is nearly always present and sometimes the Intient struggles violently To this succeeds (2) a stage of complete an esthesia, with relaxation of the muscles and suspension of reflex action This is the stage in which surgical operations are performed it may be looked on as fully developed when touching the conjunctiva fails to cause reflex closure of the cyclids. If the minalation of chloroform is continued (3) a stage of par lysis sets in Respiration becomes slower and more feeble, the heart's action becomes weaker and death ensues from paralysis of respiration or from arrest of the heart's action. Death however may occur during any stage of the inhalation, and may be due (a) to sudden stoppage of the action of the heart, hable in exceptional cases to occur at any stage or (b) to asphyxia which may be brought about in various ways eg by closure of the glottis, owing to pressure of the tongue or by blood or vomited matter finding its way into the air passings In more than one case death has occurred within two minutes of the commencement of the inhalation. In one case thirty drops and in another fifteen to twenty drops inhaled in vapour crused death much larger quantity than this (alout 31 drachms) is commonly required to cause an esthesia. The more concentrated the vapour the more likely is danger to trive. The death ratio from chloroform during operations is variously estimated at 0.75 to 3 4 per 10 000 cases.

Cases occasionally occur in which an individual alleges that he or she has been rendered insensible by chloroform and while in that condition robbed or raped. As heating on the question of the truth or falsity of such charges, it may be noted (1) That chloroform vapour does not cause immediate meansility, and that it is difficult to administer chloroform to crsons against their will, unless considerable force is employed 2) That to successfully administer chloroform vapour during leep requires the greatest skill and care, and even then can nly be accomplished in a small proportion of cases, and (3) that inhalation of chloroform may cause sexual excitement, ecompanied by delusions, remembered after recovery of sensiultry, and believed to be real events <sup>1</sup>

Treatment.—If liquid chloroform has been swallowed, the tomach pump should be used at once. In poisoning by the apour it should first be pointed out that chloroform vapour hould always be given greatly diluted with air, and on a searly empty stomach, and that its administration should be voided in patients suffering from certain cardiac discress. In asses of poisoning, the patient should be pfaced in a lightfacture ossition and cold affusion, artificial respiration, and galvanism imployed. It should be seen that nothing mechanically impedes respiration and that the tongue is well forward it may be necessary to draw it forward with a pair of forceps curning the head on one side will often suffice, and will, at the ame time, allow of the escape of vomited matters, etc.

Post mortem signs.—Not characteristic The blood is usually dark coloured and very fluid After death from swallowing liquid chloroform signs of inflammation of portions of the gastric mucous membrane have been found

Detection — Death from chloroform may occur, and analysis fail to detect the presence of poison in the viscera, owing to its—having escaped by volatilization, or its having become decomposed in the body. This last may be due to the action of alkalies, a formate of the alkali being formed according to the following equation CHCl<sub>3</sub> + 4KHO = KCHO<sub>4</sub> + 3KCl + 2H<sub>2</sub>O. From organic mixtures chloroform may be separated by distillation, and recognized in the distillate by its peculiar order. Or the mixture, first neutralized if and, may be distilled, and the vapours passed through a glass tube heated to redness. Under these circumstances the chloroform is decomposed with formation of hydrochloric acid and free chlorine. The presence of the first is shown by the vapours reddening moistened blue litmus paper, and producing a white precipitate in silver intrite solution, and of the second, by the

<sup>1</sup> Lauder Brunton's Pharmacology p 723

vapours causing a blue colour to appear on paper soaked in a mixture of starch and potassium iodide solutions

Case —Chloreform possoning—nucdal by mbalation —A Furasum vousan was found dead in her bed with a handkerched on her mouth and nose covered over by a pillow and a bottle containing chloroform lying near the handkerched with chloroform drb ling from it Tie door of the room was bolted from inside The husband and the wife were not on good terms and she made a sun lar attemt to the held with chloroform about six months prior to this incident. There were marks of blisters on her jing and icheck and inside the nostrils, which were the object of the control of t

#### Chloral.

This is used in medicine as a hypnotic in the form of chloral hydrate and has in several cases caused death. It causes deep sleep followed if an overdose has been taken by come with motor pandysis, and slowing weakening and ultimate arrest of the heart's action and of the movements of respiration. These effects appear to be due to the action of the drug on the nerve centres and not on the nerves. The pupils are nearly always contracted. A skin cruption in some cases resembling that of scarlation in others urticaria or purpura has been observed. Possibly in many cases the fatal result is attributable to the decomposition of chloral within the body into chloroform. This may be effected by the action of alkalies a formate of the alkalie beng at the same time formed thus CHCl<sub>1</sub>O+KHO = KCHO<sub>2</sub>+CHCl<sub>2</sub>. Sometimes a single overdoss of chloral crusses sudden death by surgone.

Fatal dose—The probable minimum fatal dose cannot be stated with certainty. In one case thirty grains or not more than a full medicinal dose, caused the death in thirty-five hours of a woman at twenty. Persons however have recovered from doses of 150 and 160 grains. The syrup of chloral B P contains ten grains in each fluid drache.

Post mortem signs —Considerable congestion of the vessels of the brain and its membranes has been observed

Treatment - Evacuate the contents of the stomach preferably by the stomach pump, administer decoction of coffee freely.

<sup>2</sup> From the experiments of Hammarsten it would appear that chloral ordinarity acts without undergoing decomposition into chloroform (see Lauder Brunton s Pharmacology p 715) introducing it by the stomach pump if necessary, keep the patient warm, and endeavour to restore respiration. Hypodermic injection of strychinia is strongly recommended by several authorities, its efficacy is denied by others. If used, two or three drops of the solution of strychinine, BP or IP, may be injected and very cautiously repeated at intervals of fifteen or twenty minutes.

Chronic poisoning by chloral.—The long continued use of chloral in medicinal doses may give rise to skin cruptions of the character noted above, impairment of the cerebral functions, and partial paralysis of the limbs—In some cases, insumty has been attributed to chloral dirnking

Detection.—Organic mixtures containing chloral should be rendered alkaline by caustic potash, distilled, and the vapours tested for chloroform

Bromal hydrate, the corresponding bromine compound, has a similar action to chloral hydrate but is a more powerful poison

## Cocaine.

Cocame the active principle of the Coco, or "Divine Plant," of the Incas of South America, Erythrozylon coco, the leaves of which are still chewed by natives of South America as a restorative against the strain of fatigue. This alkaloid is largely used as a local anaesthetic by dentists and others, but is of medico legal interest from its abuse as a cerebral excitant and narcotic

In India, since about the year 1900, the eating of occaine hydrochloride has become a habit with many persons, especially in the larger otties, where it is extensively used as a pleasing intoxicant or stimulant and aphrodisiae by natives of India, and to counteract the soportific and prostrating effect of over indulgence in opium. It is sold now in most bazaars by the pan 'betel' sellers.

Action.—Locally of paralyzes the terminals of the sensorynerves, blanches muonis membranes, and is quickly absorbed, dilating the pupils Internally it first stimulates and then paralyzes the nerve centres of the brain and cord, dilating the blood vessels. The stimulation is of an exhilarating kind Cocaine "fascinates by the promptness with which it relieves all sense of exhaustion, dispels gloom and exhilarates, producing a sense of happiness and well being, which transports at once to a longed for elysium, but this exhilaration is followed by a state of mental depression. Through continual indulgence an intense craving for the drug or its effects is produced. (Dr. A. H. Brundage). The results of the cocame habit are even more demonstring and harmful than those produced by over indulgence either in alcohol or morphine. In post nous doses it ultimately shows the heart reduces the blood pressure and paraly res respiration inducing coma and missing the temperature, and convulsions may occur from the asphyxial coma. In chronic poisoning patient feels as if gruins of sand or worms were under the skin—this is 'Magnuns' symptom. The post mortem symptoms are those of asphyxia and coma with blood clost in and near the heart.

Fatal dose —About two thirds of a grain of cocaine hydrochloride injected subcutaneously caused death of a woman sged 71 in five hours, and ten grains of the hydrochlorate swallowed by a woman caused deeth in 40 or 50 minutes. Habiturition establishes toleration for much larger doses. Some deaths have occurred through its use in order to procure local anvesthesia in dentistry.

Treatment—If poison was swallowed use stomach pump If injected hypodermically administer stimulants with inhala tion of chloroform or if the syrams hamper respiration may be necessary

Tests for cocaine and allied substances -The following method is recommended by Dr E H Hankin -

Cocane tropococaine alypin and scopolamine form precipitates with solutions of pern angulate of potassium, which may assume a crystall ne form. By the adoption of the following procedure the use of permanenante results in a very delicate test for these substances.

permangante results in a very delicate test for these substances (1) byread a drop of a strong permanganate solution on a glass sile and allow it to dry Thus a tiln of munuto permanganate crystals is

formed on the slide

(2) On the glass slide near the permanganate film place a drop of a saturated or half saturated alum solution
(3) Put into the drop of alum solution a very small trace of cocaine

It dissolves at once

(4) With a coveral p draw the drop of alum solution up to the edge

of the permanganate film. Then allow the covers! p to fall so tlat the alam runs over the permangar size
(5) Do not disturb the covers! p Within a minute or two the

characteristic crystals of perman, made of cocame begin to form 'Under the microscope the precipitate is seen to consist at first of only drops of red colour These gradually dissolve p rr passe with the formation

of the crystals. These crystals it isolated are nearly square in shape Crystals of this form develop instantly if the covership is moved. If the covership is not disturbed the crystals usually assume the form of branched irregular masses which show a remarkable play of colours when examined under polarized light. These occame permanganate crystals have a pale pink colour, and are quite unlike the dark coloured permanenance crystals that may form near the edge of the covership.

Crystals of cocume permanganate are soluble in a strong solution of cocame in alum solution. Hence if too much cocame has been used the crystals may fail to develop. In such a case the crystals may often be

caused to appear by addition of another drop of alum solution

If a number of specimens of cocame are being examined time is saved if coverships are not employed. The drop of alum containing the supposed cocame is simply smudged over the permanganate film, and the crystals will be found to form nearly as readily as under a covership

Cocame is occasionally sent for examination mixed with 30 to 50 per cent of anthypine. The anthypine interferes with the permanganato test It is necessary to remove it. To do so, dissolve the powder in water. Add ammonia. This prespitates the cocame and leaves the antipyrine in solution. Filter. The residue of cocame on the filter paper, when dissolved in alum readily responds to the permanganato test.

Alypn gives somewhat similar crystals when tested with a perman quante film. But they differ from those yielded by cocaine in that, iristly, they form less readily with alum solution as a solvent better if the alypin is dissolved in a strong solution of potassium bromide and best of all if the alypin is dissolved in water. Secondly alypin perman ganate crystals are more elongated and more jagged in outline than those formed by cocaine

Crystals formed by tropacocame and permanganate are not pulk as a rule, but red in colour. They are best formed when the tropacocame is dissolved in water. They may take the form of curved feathery masses.

Scopolamine forms crystals with permanganate with some difficulty. They may appear when a strong solution of scopolamine in water is placed on a permanganate film. They often take the form of prisms pointed at one end and blunt at the other.

Permanganate crystals can usually only be obtained from lactate of occume after the latter has been decomposed so as to remoe the organic and Ammonia is added to a solution of lactate of eccame. The solution is then shaken up with chloroform. The chloroform is separated, washed, and shaken up with a small quantity of a solution of alum. The alum takes up the free cocame which can then be subjected to the test.

If pieces of paper in which cocume is supposed to have been wrapped up are received for examination a small piece of the paper is cut off, scaled for two or those minutes no a drop of almo solution. The latter will then give the permanganate test. Or the paper may be extracted with chloroform which will dissolve the occame 1

Lett, in the Quarterly Journal of Inebriety for April, 1899 describes a method which he has devised which will detect this alkaloid in the urine of those who use the drug

See Hankin Tests for Cocame and certain other Anaesthetics, The Analyst, vol xxxvi January, 1911 Ten or twenty obscess of urns is taken to which is asked pekass um or sodium carbonate until the muture is alkaine. It is allowed to start for half an hour and then filtered. The filtrate is agitted with two onness of pure sulphtime either. The either is withdrawn and to it is added one drachm of dilute hydrochlore as d of a strength of ten minims to the sounce. The is shaked with if e either and placed in an open day from which the either evaporates spentaneously a gentle hast teing apple die oblatin a perfect solution of any alkaloid on the surface or ashering to til e is des of the dash. The remaining I quid may now be tested for occasion.

A solut on of terchlor le of gold s made by dissolving ten grains of the terchlor de in one ownee of water This ailed to the othered extracts wil give if cocaine be present a yellow or yellowish white precip tate. The prece p tate set also clot dy heat in it a presence of a little free acd. Upon bo ling the vapour given off has the olour of benzo c soid. The subton states that it benzous ex du present it can only come

from the presence of cocaine

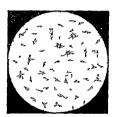


Fig. 51 Coca ne Crystals
As obta ned by My 7's respent under ) objective after Lett.

The test by Myer's reagent is as follows. To a portion of the residue left from the ether evaporation add a few drops of the test reagent a white precipitate will at once be formed if cocaine is present which dissolves by I cat and upon cooling throws down yellow crystals which under the microscope (b objective) up pear as depicted in Fig. 54. If there is an excess of the precipitate the undissolved portion will fuse into yellow gaminy masses upon boiling. In following out the test with Myer's reagent should the patient be taking quime it will first be necessary to precipitate this alkaload from the solution to be tested by pierie and in excess filter and make the test with the filtrate thus obtained. The hint of Myer's

reagent appears to be about one part of cocaine in 30,000 of water

Cases -The following cases are reported -

(a) B D, a Hindu pressman, aged 23, of Calcutta, was addated to school and to cocaine. On May 28th, 1912, be played cards with an frenda up to a late hour of the night and distributed pan (bate) in the frenda up to a late hour of the night and distributed pan (bate) in the frenda up to a late hour of the night and distributed pan (bate) in the place soon after, and at 280 A is on the 29th he was found lying uncon scoons and grouning at a neighbour s doorway. Metical aid was sum moned, the man was removed to hospital, but he died on the way there always to the place of the sound lines, kidneys, brain, and the microus membrane of the stomach wormal lungs, kidneys, brain, and the microus membrane of the stomach contained about 2 ounces of recently taken food without any special odour. Cocaine was found in viscera and urine — Dr C L Bose, Chem Exam Reng, 1913.

(b) K, a Hindu female, aged 29 years, a woman of the town, in the habit of taking cocame, left borne about 130 v u, and returned at 520 Am a few hours later. She was seen to be staggering while washing her mouth at a hydrant hard by Yery soon afterwards she lay down, became unconscious, and in a few minutes died. Autopsy showed body fairly nourished, rigor mottis present, pupils slightly contracted, no marks of violence on body. Brain and its membranes, liver, spleen, kidneys, ovaries, bladder and mucous membrane of the stomach were found congested. Right heart was dilated and continued dark fluid blood. The stomach contained about 3 onnces of recently taken vegetable food without special odour. Cocame found in the viscer, in marked quantity.

and no other poison

(c) M K, å Hindu female, aged 20 years, lived with her husband in Calcuita On the 17th October, 1012, she viated her suster in law, Lukhi, and at about 7 PM on the following day, she offered Lukhi some white powder which she believed to be a specific remed; for eachity and indigestion. They each took some of the powder, and within half an hour they became ill and their unconscious Makhan died soon after, but Lukhi reguined consciousness about 4 hours later and recovered—Autiopsy showed rigor mortis present, body well nourshed, pupils slightly contracted, no external marks of violence Brain, the meninges, and the lungs highly conjested. Iver, spleen, kidneys, largna, and trachea also congested Stomach contained food Cocame and no other poson present in the viscem Death took place in this case in about half an hour

(d) I. h., dd not terminate fatally. The does taken rendered the patient unconscious in half an hour and kept her so for four hours. Her pulse and respiration are said to have been normal during her stay in hospital, and her pupils slightly dilated. In the stormach washings cocaume was detected, but no other poison—Dr. C. L. Bose, Chem. Lzam. Beng.,

1907.

Several chronic cases are reported in I M G, 1902, 85

### Coal-Tar Derivatives.

Of the countless coal-tar derivatives many are used by patients on their own responsibility to relieve headache or procure sleep, and hence poisoning is not infrequent. Antifebrin, antipyrin, phenacetin, pyrogallol, sulphonal, and aspirin, act as blood poisons, disintegrating the red blood-corpuscles and converting the liberated hemoglobin into methamoglobin

Antifebrin or Acetanilide —Five grains' in an adult have frequently produced toxic symptoms with cyanosis and reduction of temperature. It is contained in 'headache' or 'Daisy' and other proprietary powders for the rehef of neuralgia, etc.

Antipyrin produces similar symptoms occasionally Phens. cetin has in two instances at least caused death with evanosis One, a girl, died in a few hours after taking fifteen grains of phenacetin, and a boy after taking a fifth dose of fifteen grains within three weeks Pyrogallol or pyrogallic acid causes dyspaces, reduction of temperature and sensibility, paralysis, cyanosis Four fatal cases from external application for psori-Treatment -Evacuation of stomach, administration of stimulants and external warmth, and inhalation of oxygen Naphthalene may produce toxic effects even from external use, cyanosis and muscular twitchings Sulphonal used as a hypnotic produces ataxia and death in large doses. It is cumulative. Death has occurred in a man aged 50 who took for four weeks doses of 7 to 22 grains also in a woman aged 47 who took 15 to 22 grains almost daily till total reached over 2 ounces The leading symptoms are staggering gut, thick speech, ataxia paralysis of facial muscles, convulsions, coma, etc. and death from heart failure and probably uremia. Urine is claret-coloured from hæmato-porphyrin as well as unchanged sulphonal Treatment -- Empty stomach give purgraive and large enemata of warm water and alkalies.

Aspirm, or Acetyl Salicylic Acid This acts as an irritant as well as cerebral poison. It is known to pass unchanged through the stomach and upper part of small intestine, and is then converted into fine salicylic acid.

Gase — Case of Aspara possoning — A sergeant U S A. a seed 21, was admitted to the Thetitord Multiary Hospital on October 22, 1918 with the history of having been taken ill two days previously with influenta. He was powerfully built and gas no history of previous switch influenta in the control of the same and the s

passed by the bowels and he rapidly became unconscious. He died a few hours later.

Necropsy -The last five feet of the ileum were acutely congested. and the creum and colon were loaded with blood clots The line of demarcation between healthy and congested bowels was very definite The small intestine was uniformly inflamed. The mucous coat had apparently disappeared, leaving the submucous coat and blood vessels exposed and eroded Bleeding from this large area had evidently been the cause of death. The other organs were healthy -Lancet, January 11, 1919, p 64

Veronal or Barbitone -This dangerous new soporific drug has caused several deaths in England It is a urea derivative, diethul-malonul urea, and occurs as a white odourless or stalline powder. It is used by the laity like sulphonal and trional, but is now placed on the list of poisons Toxicity and fatal dose -Its medicinal dose of 5 to 10 grains sometimes causes giddiness and loss of muscular co-ordination Toxic symptoms are reported after two doses of 10 grains each (BMJ, I 1907, 250) Death has followed a dose of 15 grains, 90 to 105 grains (BMJ, II 1909, 1154, Lancet, I 1909, 1557), 170 and 232 grains (Ehrlich, Munch Med. Woche 1907) Recovery in three days after 100 grains taken with suicidal intent (Taylor. M.J., II 616)

Symptoms -- In small doses, profound sleep, respiratory enfeeblement tending to respiratory paralysis cyanosis, feeble pulse, variability of pupils and reaction to light Under moderate doses thirst, itching of legs and reddish violet rash, or spots on the body, urine cherry red in colour Large doses, coma

Treatment.—Linetics, followed by coffee, and strychnine hypodermi cally

Post Mortem Appearances - Generally those of irritant poisoning

Detection.-Veronal is a colourless crystalline solid which melts at 182° C The crystals, under a low power, are hexagonal prisms, and dissolve with difficulty in cold water, floating on top even on shaking, but dissolve in 12 parts of boiling water, and freely in alkaline solutions To the solution thus obtained mercuric nitrate solution gives a white precipitate The dry powder mixed with dry sodium carbonate and heated in a test tube, evolves ammoniacal vapours, detected in usual manner, colouring moist red litmus paper blue, and turmeric brown, when held at the mouth of the tube (A Condy). A specific test is A saturated solution of veronal acidified with mitric acid gives a white pre cipitate with Millon's Reagent, soluble in excess A method of extraction and recognition in urine has been given in Arch d Pharmacie, 1904, 2426 -- Martindale and Westcott, Ext Pharm, II, 1912, 859

Cases -(1) Mr Trevanion, aged 27, addicted to the veronal habit, died from an overdose at Hove, in September, 1912, but whether there was suicide or foul play was not ascertained. Evidence showed that 150 grains were taken in coffee, and he was unconscious within about one hour.

(2) Man, aged 83, a heavy drinker, who had taken 100 grains with suicidal intent five weeks before and recovered in three days, took about 120 grains on early morning of June 29, 1009 At 9 45 a M he was deenly comstose, surface warm, respirations 32 pulse 102, mucus in throat, cornea insensitive, pupils moderately dilated, reflexes abolished At noon still comatose, pupils contracted, winced on slapping face 8 PM same, unable to swallow 11 r m, same, but pupils delated and could swallow a tesspoonful at a time July 1. 9 a m . not quite so deeply comatose winced on slapping face, as bowels not open, gave one minim croton oil, temp 102 22, pulse 110 reflexes still absent 10 PM, temp 102 4°, finger nails dusky, breathing impeded by mucus, bowels not open, so calomel 5 grains July 2. 9 A M., better, could be roused to speak a few words, pupils dilated, temp 1024°, pulse good, reflexes absent, bowels still not open, soon asleep again During day swallowed better, and could be roused by lond speaking July 3 8 A M . condition same. temp 102 8°, resp 36, bowels still not open, croton oil one munim repeated, cornea and pupils insensitive, not any more rousable 8 PAL. more comatose, temp 103 2° pulse 180, resp 40 July 4, 230 PM, temp 104-2°, resp over 40, pulse 150 Died 6.30 PM, comatose PM Nothing found except intense concestion of lungs, liver, spleen, and brain, due no doubt to the asphyxial form of death. Mucous membrane of alimentary tract concested, otherwise normal -Dr Durant. in Taylor. M J . 1910. II 618

Resorem produces toxic symptoms like phenol Nitro-glycerine -This is a heavy, very explosive only liquid almost insoluble in water, but soluble in alcohol, ether, and chloroform Mixed with silicious earth, it forms the explosive known as dynamite. Nitro-glycerine is a narcotic poison, acting more powerfully when inhaled in vapour than when swallowed as a liquid. In some persons, even minute doses cause violent headache. Several cases of poisoning by nitro glycerine have occurred in Sweden the symptoms being narcotic in character In a case mentioned by Taylor, vomiting and purging were also present Benzene or benzol a liquid prepared by distillation from coal far naphtha, used in the arts as a solvent, is a powerful narcotic poison. Inhalation of its vapour has caused narcotic effects with twitch ings of the muscles and convulsions. Taylor 1 records a case of a boy who swallowed about three ounces of coal naphtha and died in three hours The symptoms were delirium followed by come with contracted pupils. There was complete loss of muscular power and great difficulty in breathing Nitro-benzene, artificial oil of bitter almonds or essence of mirbane, obtained by the action of strong nitric send on benzene, is a liquid possessing the same oldur as hydrocyanic acid, and a powerful narcotic poison The symptoms produced by it are exactly the same as in poisoning by hydrocyanic acid, but with one remarkable point of difference, viz that there is an interval generally of at least two hours, but sometimes longer, between swallowing or inhaling the poison and first appearance of the symptoms. Several deaths have been reported from swallowing nitro benzene In one case quoted by Taylor a boy, at thirteen, swallowed a small quantity, no symptoms appeared for several (apparently eight) hours, be then suddenly because insunside and died four hours after the attack, or twelve hours after swallowing the poison Blyth considers it probable, from recorded cases, that 151 grains, or even less, would, if swallowed, prove fatal to an adult Death also

<sup>2</sup> Potsons, p 656

has occurred from inhalation of the vapour, as in a case reported by Dr Letheby,1 in which a man, et forty three, having accidentally spilt some nitro benzene over his clothes, became comatose in four and died in nine hours. Bad effects even are said to have arisen from washing with soap scented with nitro-benzene, especially when hot water has been used

Aniline dyes .-- Aniline or Phenylamine, obtained by the action of nascent hydrogen (which may be evolved by the action of acetic acid on iron) on nitro benzene, is a powerful narcotic poison, acting similarly to hydrocyanic soid. It is remarkable that the sulphate of aniline appears to be almost mert to man . Symptoms of poisoning, however, have followed from external application of the hydrochlorate of aniline

and the use of brilliantly coloured clothing dyed by amiline

It has long been known that it can readily gain access to the circula tion through the lungs, respiratory passages, and digestive organs, and much evidence is accumulating that it may enter the system through the skin. In the body it undergoes partial oxidation, leading to the formation of amidophenol or its derivatives (a similar result occurs after the ingestion of acetanilide or antifebrin) and these bodies are capable of producing destruction of the red blood corpuscles cyanosis, and dangerous collapse. The various aniline colours are mostly prepared from resamline, a red colouring matter usually manufactured by the action of arsenic soid on aniline, and hable therefore to contain arsenic There is some reason to believe that certain of these dyes, even if free from arsenic may produce ill effects. Aniline dyes, therefore, should never be used for colouring articles of food They have, however, been used to colour confectionery and Chevers mentions the use by native females of red aniline dyes for painting the lips, and refers to a case of poisoning in a child from this practice. Essence of peppermint has been found coloured. MM Landouvy and Brouardel in 1900 recorded in the Bulletin de l'Academie de Médecine ten instances in which the wearing of yellow boots by children had been followed by very grave symptoms In every case the colour of the boots was due to their being stained with a liquid containing aniline

Cases -An infant, 17 months old, was taken out of doors for an airing Under these circumstances it was accustomed to be very lively but on this particular occasion its general demeanour underwent an extraordinary change, its face became pale and blue, it fell into a deep sleep, and shortly became quite insensible. After two hours of vigorous treatment, the child which had appeared to be dying recovered. A few days elapsed, and then a brother, aged six, was taken out for a walk shod in a similar manner Three hours later he returned apparently thoroughly chilled and looking very blue The cyanosis passed off after shod in a similar manner a few hours, but his face did not regain its ordinary appearance until the following day. On a subsequent occasion a similar outing was followed by a similar train of phenomena Eventually it was discovered that the fluid which had been used for staining the boots contained aniline, and it was recognized that the cyanosis resembled that seen in aniline makers. Not long after these cases were reported it was ascertained that six out of seven children of one household had developed similar symptoms after wearing yellow boots They suddenly became ill, com plained of chilliness and exhibited pallor of the face with blueness of the lips and hands Three of them remained unconscious for several hours,

<sup>1</sup> Taylor, Poisons p 666

the heart's action became very fieble, and the urine contained a trace of albumen In still another case the evanosis was so profound that a diagnosis of morbus carulens was made and attributed to a sudden reopening of the foramen ovale. Analysis showed that the bound used to give colour to the boots contained 90 per cent of aniline When it was injected subcutaneously into young cuines pigs and rabbits they developed identical symitoms in from hiteen to thirty minutes. The same results occurred, but more slowly when it was eigen by the mouth Similar toric symptoms appeared when a few drops of the hound were placed on the nasal and buccal mucous membranes, also when the animals were made to inhale the vapour from the heated hand, and after painting it over a considerable area of shaved skin. In the latter case some of the animals died within thirty six hours. The red blood corpuscies decreased in number and the spectroscope showed the characteristic absorption band of metha moglobin. Further experiments revealed the fact that absorption by the skin occurred with special facility in a moist and heated atmosphere. An instance was recently reported of an American girl who was porsoned by the ink used on type writer ribbons. She stained her fingers with the ink, and thus conveyed come of the latter to a sore on her upper lip. Acute toxic symptoms subsequently quickly developed associate I with great adema and pain locally and a fatal result shortly afterwards ensued

Detection of Amiline.—Amiline (1) with sulphuric acid and manganese dioxide or lead peroxide gives a green colour, changing to a persistent blue and then to black, and (2) with solutions of hypochlorites, e.g. c'iloride of lime gives a blue or violet colour soon cha iging to brown Astro benzene may be recognized by converting it into anilme and applying the above tests. The conversion may be effected by dissolving the nitro-benzene in alcohol, and adding bydrochloric acid and zinc.

I rom the acid liquid after driving off the alcohol amline may be separated by neutralizing the liquid with carbonate of sods and shaking the neutralized h juid with ether. The ether is then separated, allowed to evaporate and the residue tested for aniline. Benzene is detected by converting it first into mire benzene by treatment with mirre acid, and then into aniline as above From organic mixtures benzene and mitrobenzene may be esparated by distillation. If the matters to be distill d are first acidulated with sulphuric acid aniline if present will be found in the residue left in the retort, and may be separated from it by blas process (see p 545) using ether as a solvent Aitro-benzene may become changed in the body into amline

Carbolic acid or Phenol -Phenic acid or phenyl alcohol. obtained from coal tar, is largely used as a disinfectant and is sometimes used for suicide It is the active ingredient of many disinfecting powders eg (alvert's which contains free carbolic acid mechanically mixed with siliceous matter, and separable from it by distillation, and Macdougall's, which contains carbolic acid in combination with lime, calcium sulphite being the present. From Mardonnall's periode, carbolic acid may be separated by decomposition with dilute hydrochloric acid Carbolic acid is a powerful poison, causing, when swallowed, burning pain in the mouth and threat, whitening and hardening of the lining membrane of the mouth, and occasionally vomiting. Insensibility speedily follows, passing into come, with stertorous breathing and contracted pupils The urine is suppressed or scanty, and of a dark or olive-green tint. FATAL DOSE - Death has occurred in ten minutes, the usual fatal period, however, is one to four hours One and a half teaspoonfuls of the concentrated acid has caused death, and in four cases out of five, 15 grammes (2314 grains) proved fatal to adults. Half an ounce is almost always fatal. Dangerous symptoms may be caused by six or seven drops, and death has resulted from its external application with gangrene, especially in lower extremities Resorcin, a substance closely allied to carbolic acid, and like it used as an antiseptic. has a similar toxic action Detection .- (1) The odour of carbolic acid is characteristic, and may be recognized during life in the patient's breath, urine, or vomit, and after death in the (2) Slips of some kinds of pine wood, moistened first with carbolic acid and then with hydrochloric acid, acquire a blue colour The pine wood should always be tested first: (a) with hydrochloric acid only, and (b) with carbolic acid and hydrochloric acid, as some varieties give a blue colour with hydrochloric acid only, and others do not give a blue colour with carbolic acid and hydrochloric acid. (3) If to a solution of carbolic acid one-fourth of its volume of ammonia be added. and then a minute quantity of a hydrochlorite, a blue colour is produced, turning red with acids, warming hastens the development of the blue tint Treatment - Alcohol is alleged to be a chemical and physiological antidote 1 Wash out stomach with Epsom salts, and give half-ounce doses of sulphate of magnesia and sulphate of soda The soluble sulphates combine with the carbolic acid to form harmless sulpho carbolates. Ohve oil in large doses-eq a couple of wine glassfuls. The 1 50 grain of sulphate of atropine may be given hypodermically.

Case—Carboke acid poseoning by absorption—A Plaistow man on leaving his work put a quart bottle of carbolic acid in his pocket. The glass was thin and the bottle broke. He wiped the acid off his body with a handkerchiet, which he three waw. He then got into a motor bus, and remembered getting out at Greengate, but after that he knew nothing more. He was taken home and died. The medical evidence at the inquest showed that the sacil had been absorbed through the porce of theskin and had thus poisoned the man—Morning-foxis, September 8, 1907.

<sup>&</sup>lt;sup>4</sup> A M Pholps in the New York Makeal Journal of January 14, 1899 calls attention to the marked anlapoint heterem alcohol and carolic and I is states that be has frequently seen Dr Powell at the Post Gradusto Hospital, pour upon his hands some pure carbolic scile and in a few number when it was you'll alcohol, and no escharotic action followed. At the present time he frequently flushes abscess carties by washing them out with pure exchole scile, and a few minutes later with pure alcohol. Tholps is of the opinion that we have ma elophic assertion against the excharotic action of pure capitolic scile.

Frequency of Datura poisoning—In Bengal etc., in the three years ending 1872 the seeds were administered in seventy soven cases affecting one hundred and twenty three persons and the Bombav Analyzer's reports for the ten years ending 1885 show that datura was detected during that period in seventy cases affecting one hundred and thirty eight individuals In the great majority of cases of datura poisoning in India the in India an individual las been first drugged and then robbed it will usually be found that datura has been employed. Some times, however arsenic or cannabis is used. A common form of theft by aid of datura is road robbery by professional high waymen and in such cases a hollow pestle is sometimes used by the disguised robbers the cavity of which contains datura or arsenic and the inversion of this while pounding grain etc. with it, introduces the poison into the food without exciting sus picion 1 Occasionally the motive of administration is other than and to theft It is of course possible that in some cases datura is given with homicidal intent. It rarely however happens that there is any ground for a specting this. In fact there seems to be a widest read popular belief in India that datura is simply an intoxicant and not a poison and certainly many of tle cases do recover Road poisoners sometimes lartake with their victims of the drugged food which they would hardly do if aware of the danger of fatal results Commonly where datura is used for criminal purposes in India the poison is mixed with sweetmeats or food but in exceptional cases the poison seems to have been mixed with tobacco given to the victim to smoke. Suicidal poisoning by datura is extremely rare (see Case p 648) Accidental cases amon, children are sometimes met with Lastly it may be mentioned that datura 14 said to be used in India by vendors of native liquor for the purpose of conferring additional intexicating power on their wares. A method said to be followed in Bombay is to pour the liquor into a vessel which has been first filled with the smoke of burning datura seeds,2

Symptoms — These generally are like those of Belladonna (which see) They are in two stages namely delirium and then come. The symptoms develop rapidly If a decotion of the seeds has been swallowed they may appear almost immediately. Usually however there is an interval commodion to more it an half an hour letween swallowing it e poison and

Dr W Canter I d Med Gas for 1874 p 116

<sup>\*</sup> The occas and presence of datura in major is mentioned see Cannabia p 644

first appearance of the symptoms The first symptom noticed is dryness of the throat, this is followed by giddiness, stagger ing as if intoxicated, flushing of the face, and delirium with widely dilated pupils The dryness of the throat increases, and swallowing becomes difficult, the difficulty seeming to depend, at any rate partly, on spasm of the pharyngeal muscles. The voice becomes changed, articulation becomes indistinct, and in one case mentioned by Taylor (from D stramonium) the power of speech was lost The vision becomes indistinct or disordered Hyperpyrexia is sometimes, perhaps often, produced In three separate cases of poisoning by datura that occurred in the Hissar District in 1916 1 remarkably high temperatures were recorded, viz 105 4°, 107 4°, and 108° respectively. The first case (a female) recovered, the other two (males) died It is known that hyperpyrexia occurs in poisoning by the alkaloid atropine, which is chemically identical with the alkaloid daturine, found in datura, but it does not seem to be generally recognized that high temperatures may also occur in poisoning by the latter, The delirium is peculiar in character The patient is restless, often wanders about, talks incoherently or mutters indistinctly, but at the same time is timid and easily controlled. He goes through various ludicrous movements appears to grasp at imaginary objects, picks at his clothes or bedding and often appears to be trying to pull imaginary threads out of the ends of his fingers These symptoms either gradually disappear or are succeeded by a stage of soper with subsultus tendinum, deepening into coma, sometimes accompanied by convulsions, followed by gradual failure of the heart's action and respiration and death. Dr Giraud, in two out of four cases of deep coma, found a remarkable tympanitic condition of the abdomen to be present If the case tends towards recovery, the sopor passes away, and is succeeded by a stage of secondary delirium lasting about six to ten hours, and in character similar to the primary delirium of the first stage. The pupils are widely dilated throughout the illness.

Fatal dose.—This cannot be stated with certainty Waring, however, writing of the tracture of the seeds (strength I to 8) considers twenty drops to be equal in effect to one grain of opinin<sup>2</sup> On this basis, a minimum fatal dose of the seeds would be about ten to fifteen grains, and a case is reported in which a decoction of 125 D stramonium seeds, equal to about state or grains, caused the death of an adult in seven hours.<sup>3</sup>

The leaves are less active than the seeds One hundred seeds of D alb  $\epsilon$  weigh about twenty one grains, of D stramonium about twelve and a half grains and of D fastuosa about ten grains

Mortality—Dr Giraud (in 1848) met with only one death in fifty one cases admitted into the Jamsetjee Hospital Bom bay, and in the ten years ending 1885 of fifty nine cases admitted into the same hospital only two died. This how ever is no exceptionally low death rate. Dr Brown of Lahore records twenty one deaths in ninety two cases. In one hundred and twenty three Bengal cases twenty deaths were reported, and of the Bombuy Analyzers one hundred and thirty eight cases twenty four died. These last three sets of figures give a total of sixty five deaths in three hundred and fifty-two cases or just under 184 per cent.

Post mortem signs —These are usually wide dilatation of the punds congestion of the bruin and its membranes and often also of the lungs and abdominal viscera. The mucous membrane of the stomach and intestines may be found congested and pitches of extravasated blood have been met with in the large intestine. Seeds or fragments of the seeds (see Ditection) may be found in the contents of the stomach or intestines.

Treatment—Administer emetics or use the stomach pump, and treat the symptoms, as they arise on general principles, eg if the pulse is feeble and the skin cold give stimulants, if narcotism is present use cold affusion etc as in opium poisoning cmiljo artificial respiration if necessary. Opium poisoned the term original hypodermically may be given if there is much excitement. Opium however is less efficient as an antidote in atropine poisoning than atropine in opium poisoning. Lauder Brunton recommends the cautious administration of physocytum, and il inger and others advise in atropine or stramonium poisoning administration of pilocarpine nitrate in quarter to half grain doses

Detection and tests — Datura seeds are car shaped and somewhat reinform with rounded thickened furrowed wavy margins strongly compressed laterally from one sixth of an inch to one fifth of an inch broad and about one twenty lifth of an inch thick Datura alba (Nees) of India has rather small subglobular and shyrply spinous capsules, and irregular trangle yellowish brown roughshis seeds which are used like those of the preceding species. The seeds of Datura strano num are black. Datura madel (Linn) which grows in Africa and

Southern Asia, has obliquely cordate, somewhat sinuate-toothed or nearly entire, soft-hairy leaves, and pendulous, spiny capsules, with brownish-yellow seeds, and, to a certain extent, resemble capsicum and tomato seeds

Seeds suspected to be datura, when found in vomited natter or in the alimentary canal, require to be carefully distinguished from the somewhat similar seeds of capsicium and tomato, both of which are extensively used as food in India









Fig 56 -Sections of Datura Seeds (enlarged)

Fig 57 —Sections of Capsicum Seeds (enlarged)

(1) Datura seeds are double edged at the convex border capsicum seeds are not (2) Capsicum seeds have a sharp, pungent taste, datura seeds are

feebly bitter, but not pungent

(3) If the seeds are laid on the flat, and divided horizontally, the

embryo of a datura seed is seen to differ in shape from that of a capsicum seed (see Figs 50 and 57), it is embedded in a white, olly albumen, and presents a specific curve like the head of a shepherd's crock. The exceptm of the pulverized datura seed is cavernous under the mucro scope, whilst the capsicum embryo is embedded in a felsky albumen and recurved like the figure 6 or 9, in which the curve from its point is like a commencing spiral.

Trom organic mixtures, or the powdered seeds, the alkaloul may be separated by Stas process, using ether as a solvent. It will be found, when dissolved in a little very dilute acid, (i) to respond to the group tests for alkalouds and (2) when applied to the conjunctiva, to cause dilatation of the pupil (See also Hyserier, p 650)

There are no special chemical tests for daturine (or atropine), the physiological test (action on the pupil) is, however, extremely delicate. In man, an atropine solution of 1 to 120 commences to act in six or seven minutes, and its effict continues more or less for several days. A solution even of 1 to 48,000 will slowly cause dilatation. Herbivora, and especially the rodents, are much less sensitive than man to the action of atropine.

/ The following note on testing for datura is contributed by Dr E H Hankin —

The cat is the most convenient animal to use in testing for datum. A drop of the solution to be tested is placed in the eye. After half an hour the animal is examined. It should be examined at first in a room If no dilatation is observed, it should be taken out of doors into the sun shine and held with its eye facing the sun. The pupils contract. The purel to which the solution has been arrelied will contract less than the other if datura is present. If even under these conditions no dilatation is visible, the treatment of the eye with the suspected solution should be repeated two or three times at intervals of an hour. It is advisable to commence experiments on the cat with a somewhat dilute solution, as a too strong solution, by producing excessive and lasting dilatation, may render the cat unfit for further use for perhans a couple of weeks, besides giving the animal unnecessary discomfort. Road poisoners who use datura have no use to kill their victims, and commonly use the numinum dose requisite for their purpose Chinese robbers in the Malay States are stated to be able to so adjust the dose that the victim will become unconscious after walking either one, two, or three miles from the liquor shop where the poison was administered. It not infrequently happens that in cases where there is ample proof that datura has been employed. none can be detected on chemical examination. If a number of persons have been possoned at the same time, as happens not infrequently with pilgrims, it may happen that examination of the vomit of each person separately fails to reveal the presence of datura, while if the residues of the vomits are mixed together so that a larger amount of material is extracted, a substance having the properties of datura is detected further difficulty in detecting datura depends on the fact that the victims of road poisoners frequently vomit in the open air, and the asserted vomit sent in to the police is received mixed with an excessively large quantity of earth A case is recorded from the United Provinces in which the vomit mixed with earth formed a package that was too heavy to be carried by four coolies

Cases - Datura possoning; road robbery; multiple homicide,-(a) In 1809 the dead bodies of three Bengali men, evidently pilgrims, were found at a place near Buddha Gava, and it was thought that they had died either of heat apoplexy or of cholers. The civil surgeon, who made the post mortem examination on these bodies, found the brain, lungs, and liver deeply congested and suspected poisoning, but he deferred giving any opinion as to the cause of death, pending the results of clemical analysis. Suspicion of foul play also arose from the fact that the deceased persons were seen in the company of another who had disappeared Analysis revealed marked quantities of atropine in the viscera of each of these three persons —L. A. Waddell, Beng Chem Ex Rept., (b) Two merchants started with a sais from Hubbi in the Dharwar Collectorate, on an expedition to buy cotton in the neighbouring villages As they were starting, a man and a woman offered themselves as cuides. stating that they would show them where cotton was to be had. At a halt, food was prepared by the woman, of which the merchants and the sais partool, all three became insensible, and were robbed One of the three died -Bo Chem Analyser's Rept , 1878-79

Cases — Datura pousoning, robbery.—(1) In 1899 a Hinda prostitute in Calcutta was visited on the night of the 10th September by two men previously unknown to her. As about midnight the men left, not the woman was afterwards found 1 jing unconscious in the room and her house robbed. She was admitted into the Medical College Hosmital

next morning in an unconscious condition. Her stomach was washed. and the washings were forwarded for analysis Atropine and alcohol were detected in the liquid. The woman recovered. The accused were after wards traced by the police and tried at the Alipore Sessions Court, and were convicted and sentenced to long terms of imprisonment. During the trial it was found out that they had committed similar offences on several previous occasions with a view to robbery -L A Waddell, Beng Chem Fx Rept , 1899 -(2) (Chevers, Med Jur, p 155) In 1852, two men, Joogul and Pertab, went at night to the house of Pearce, a prostitute at Meerut Joogul arranged to prest the night with Pearce, and, having paid her eight annus in advance went away, but shortly afterwards returned with some sweetmeats, part of which he gave her Pearce, soon after eating the sweetments, began to feel ill, and suspecting that she had been drugged, went to the door and informed a chowkeedar, who kept watch outside the house, and in the morning sent for the police The police, on arrival, found Pearce insensible, and arrested Joogul in the house, and afterwards arrested Pertab On the trial the prisoners confessed that they had arranged that Joogul should give the woman sweetmeats with which datura had been mixed, so that they might rob the house while she was insensible -(3) (Bo Chem Analyser's Rept. 1883)

Cates — Datura pousoning, motive other than theft.—(1) In a case from Aimstoil a man and his mother, after eating some nod prepared to the former, were attacked by symptoms of datura poisoning, both recovered on the third day. The wile was arrested and confected to having put datura into some cooked bhara (regetables) which she had given to her husband and his mother. A portion of the bhar, send given to her husband she his mother. A portion of the bhar, such that that she had put arsenie and accounte root into some bread, which she had given to the two sufferers. In neither case, however, were any symptoms of arsenie or account poisoning present, and no trace of either of these poisons could be found in a portion of the bread submitted for examination —(2) [10. Ghen Analyses \* Elect\*, 1881]. In a case from Bagewadi (Kaladig District), daturine was found in some sweetmeat given by one man to another, who, after eating a portion suffered from the usual symptoms of datura poisoning. The motive in this case was stated to be to make the victure. Was done in and one women.

Gate—Datura poisoning aucidal—The assistant surgeon of Ghatal reported a case in which a young Hundu female took datura seeds to commit suicide, in consequence of a quarrel with her father in law A quantity of datura seeds were found by the side of the deceased The viscens were forwarded for examination, and stropine was detected in them—C L Bose, Bong Ghom Ex Rept. 1907

Case —Fatal trad by Datura ordeal.—In 1899, an old Hindu xoman Radhha Goalan, of the milliama caste, aged about 60, reading in Hano tillage of Monghyr district, was behieved to be a writch, and her fellow villagers deputed a professional exorests (opka) to find out whether or not this belief were true. The man gave her some prepared tracale to est. Soon after taking this the woman developed marotic symptoms, and died within twieve hours. The Civil Surgeon of Monghyr who made the post mortem examination forwarded the viscera of the deceased for chemical analysis. Altropine was detected in the viscera. It is common superstition in the country that witches withstand the action of poisonous drugs—It. A Waddell, Beng Chem. Iz. Reft, 1899

Cases with recovery—under Pilocarpine —(1) Onkari girl, aged 8 years was brought to hospital unconscious Pulse breathing very feeble girl had eaten fresh and unrine fruits of dature, mistaking them for sarifa (custard apple) or scetaphal, which grew almost wild there An injection of strychnine was given and the child somewhat revived. The stomach was washed out A large quantity of chewed up datura fruit with red dish brown pulp and seeds were extracted, which were afterwards dried and neighed, and the result obtained was about 2 drachms. The shock of the pumping as peared to produce collapse Pulse could not be felt and breathing stopped Artificial breathing was at once resorted to, and breathing restored after about half a minute. Another injection of structurine was given the child revived respiration remained troubled and pulse better for some time, but again the child began to sink. A dose of brandy (1 drachm) was at once noured down the throat, and steady friction over the extremities used pulse became better and breathing fair, but the child did not recover consciousness Cold affu mona were used but without any appreciable effect. In injection of pilocarpine nitras 12 gr was given to counteract the effect of daturine, the result was marcellous, the child opened its eyes after a few seconds Another injection after half an hour, and a still further improvement was at once seen Five injections of pilochrpine nitras were given in succession within 4 hours of 1, gr each after the third injection the child was better

(2) Girl, age 1 about 7 years ate unripe fresh fruits of datura, mataking them for enstand applies blomand nump extracted a quantity of datura seed and pulp weighed afterwards and found to be about half a drachm The child however began to sink, and an injection of strychnus given at once. Two injections of pilocarpine nitras of \(\frac{1}{2}\) greater each were sufficient to review her consensors and cold affisions with forced walking were also employed. The child survived and was discharged the part day—G. Vilkopfalips, Ind Med Gar, 1913, 810

## Belladonna.

All parts of the Atropa billadonan, or deadly neghtshade, indigenous in England, contain atropine Cases of poisoning by belladonan are occasionally met with in England, and are usually accidental, arising either from eating the berries in ignorance of their poisonous nature, or from mistakes in dispensing or using medicinal preparations. Accidental cases of this last description have been reported in India Symptoms are similar to those of datura poisoning, all the secretions are lessened except the urine, in several cases a scarlet rash on the skin has been observed. Recovery is frequent in over sixty cases of belladonan and atropine poisoning tabulated by Woodman and Thyt, there were only fourteen deaths. Death has been caused by a few of the berries, and three grains of the extract, have each caused by a few of the berries, and three grains of the extract, have each caused by a fippoines. Death also has resulted from the application of stropine to a historical surface.

Does.—Ordinary medicinal doses are of atropine 100th to one twenty-fifth part of a grain, of extract of belladonna, 1 to one grain, and of the tincture (strength, one of leaves to twenty of proof spirit), 5 to 20 minims. Post mortem signs and treatment are the same as in poisoning by datura. Detection.—The flowers have a bell shaped corolla about one inch in length, dull reddish purple in colour, and pale green at the base. The berries are rounded, about three quarters of an inch in diameter, purple, black, and shining. The seeds are small, about one-tenth of an inch in diameter, and studded with projections Organic mixtures may be subjected to Stris process.

Scopola lurida leaves and stalks were eaten by Gorkhas in the Black Mountain campaign in mistake for a Nepalase vegetable and caused poisoning symptoms like belladonna—A J Muenab, Ind Med Gav. 1903, p. 365

# Hyoscyamus or Henbane.

Three species of hyoseyamus are found on the northern borders of India namely *H niger* in the temperate Western Himalaya *H pusillus* in Western Tibet and *H muticus* or \*\*nisania\*\* in the Western Panjab, Sindh and Baluchistan dis-





Fig 58 -- Hyosoyamus Seed and Longitudinal Section Magnified 7 diameters.

tributed to Kabul and Asia Minor, whence the Indian name for the seeds of the latter Khorasani awan (Hind) or Khorasani owa (Bom) The latter species from its delirinit and intoxicating properties is known as Koh i bhang or mountinn hemp, from a fanced resemblance to Indian hemp, and is said to be smoked in small quantities by debauched fixirs, and to be used by evil disposed persons to injure those with whom they had a quarrel. It was described as causing dryness and constriction of the throat, and furious delirium. In Sindli, writes the Commissioner, in 1894 regarding H multius Balinchis, who use it as an intoxicant, dry the leaves and flowers and smoke the mixture exactly like ganga. But it is very powerful and makes them positively mad. Under its influence they strip themselves naked and dance about like fluences they strip themselves naked and dance about his fluences.

it flowers in March I have ascertained that it is used in this way all along the Sindh border Baluchis and Sindhis (and especially those of mixed Sidi and Baluch breed calling them selves Gaddos or khaskelis the descendants of slaves) are addicted to hemp drugs which are grown or manufactured in Sindh on the Munchar Lake and the use of henbane is stimulated by the sale of the hemp drugs being a monopoly and the drugs themselves more expensive All of these Indian species of hyoscyamus contain a poisonous all aloid hyoscyamine and hyosene resembling atropine in action but weaker! The leaves of H nuger are officinal in both Indian and British leaves of H niger are officinal in four indian and Dicisson Harmacoporas Dose—Ordinary medicinal doses are of the extract (of the leaves) five to ten gruns and of the tincture half a drachin to a drachin. Of hyoscine a fatal dose is a quarter to half a grun Symptoms, einerally like addura some delirium and excitement at first followed by drowsness unconsciousness with complete paralysis and in fatal cases death in a few hours A few (not Indian) cases of poisoning by hyoscyamus have been reported In one a woman suffered severely but recovered from a dose of eleven drachms of the tincture and in another six adults of whom one died were poisoned by eating the roots in mistake for parsnips. In a third two boys one of whom died were poisoned by the seeds Treatment as in datura poisoning Detection—Dymock describes the bizzar seed as reinform—laterally compressed equal in size to that of *H* niger<sup>2</sup> (see Fig 58) of a light brown or grey colour the testa is finely reticulated. The albumen is only The embroyo curved like the figure 9 the tail of the nine being represented by the radicle. The taste is only bitter and acrid Hyoseyamine applied to the conjunctiva dilates the and term Hyosysamme appried to the conjunctiva transition pupil and may be recognized but not distinguished from atropine by this property. It may be separated from organic mixtures by Stas process as for atropine, and hyosysam crin be distinguished from atropine and by oscvamme by the bromine. test

Hyase ne Pe son ag —Cr ppen Case —An American quack charged October 1910 with murder of his wife by hyasens and brutally exting up her body into small p cess burying it under the floor of a house in Hilldrop Crescent London Hentification was made through the sear of an old abdominal operat on and the wheat to at the yegamas which some of the rema ns we we rapped with those of the accusal Two some of the rema ns we warrapped with those of the accusal Two examined. The hyaseine was determined to be such undoubtedly by it bromme test. Accused paid the leath penalty

Dr T E. Stocks INS in Hookers Jour Bot 1852 p 1781
See Peport by W Dunstan in Agrici l. Ledger 1879 No 5

#### Solanine

This is a poisonous nursoite alkaloid contained in the stalks and berries of the potatoes and other plants belonging to the genus solanum, NO Solanacca <sup>1</sup> A few cases of poisoning by plants containing solanine are on record In many of the cases there have been thirst, romiting, and purging Usually severe nervous symptoms are present, eg convisions, delirum, and coma Dilatation of the pupils has also been reported, but, according to Lauder Brunton, solanine is entirely without action on the pupil The following species may be specially mentioned—

Solanum tuberosum, or Potato -- A fatal case in a girl at fourteen from eating the berries of the potato is reported, and another, in which four persons, all of whom recovered, were poisoned by eating potatoes which had commenced to germinate Mature potato tubers ordinarily contain only a trace of solanine, 0.06 per cent, but occasionally contain more, and so cause poisoning Sixty six soldiers at Pfuhls were poisoned by potatoes which contained 0 38 per cent of solanine when raw, and 024 when cooked, and the symptoms included severe jaundice, and in one case convulsion (Med Press and Cir, 5th June, 1901) Solanum dulcamara, butter sweet or Woodu mahtshade -This, a common hedge plant in England, is officinal in the British and Indian Pharmacopanas. A child of four is said to have died from eating only two of the berries According to Dymock, the dried fruit is imported from Persia into Bombay, where it is known under the name of Anabe s salib Solanum migrum, or garden nightshade, Makoi (Hind ) Kamuni, Ghati (Bom ), Manattakkalı (Tam ), Kakmachı (Beng ) -This, found in gardens in England, is common wild in India Woodman and Tidy cite two cases (both in Europe) of poisoning of children by the berries, in one, two were poisoned and one died, in the other, three children, all of whom died, were poisoned A case also recently occurred in harachee, in which three children, one of whom died, suffered from symptoms resem bling those of datura poisoning after eating food with which Solanum ntarum berries had been mixed

# Indian Hemp.

Indian hemp, or Cannalus satua, NO Urticacea (see Fig. 5), when grown in India, differs so widely in medicinal properties from the same plant grown in Europe that it formerly was regarded as a distinct species, hence the old name Cannalus Indica. It is met with in the bazaars of India in four forms, viz · (1) Bhang, suddh, sabz, or in paharty a dar, the dried leaves and small stalks, (2) Ganya, the flowering tops; (3) Charas, the resin which exides from the leaves and branches—this is often adulterated. I have found thirty to fifty per cent of mineril mitter in specimens, and (4) Majum, a sweetinest prepared with hemp. In India hemp appears to be seldom, or ever, used for homicidal purposes. Fatal, accidental or suicidal,

<sup>&</sup>lt;sup>1</sup> About one eighteenth of an inch in diameter, and weighing one hundred and twenty to the grain (Guy)

cases have, however, been reported. Cases also have been reported where the drug has, or appears to have, been used for the purpose of facultating the commission of an oftence. It is extensively used in India as an aphroditive, and with that object is a sweetmeat handed round at Nautches. Thus Chevers mentions a case which occurred at Ahmedhacar, in which a



Fig 59 —Indian Hemp Cannabis sativa

woman, having first drugged with mayon a child aged seven, afterwards murdered him for the sake of his ornaments! Charara is used by road-poisoners at Amritsar, in order to facilitate theft. A case also is reported by Dr. Cullen, of Hoshang-ladd, in which mayon was given to a woman and her daughter,

<sup>\*</sup> Med Jur., p 225 \* Beng Med I ct Rept , 1870-72, p 268.

" not with the intention of causing death, but to effect a criminal purpose" In these two females the symptoms present exactly resembled those of datura poisoning and it would appear that datura is sometimes used as an ingredient of majun 1. In a case sent by the Bombay police in 1883, some food, alleged to contain cannabis, and to have been used for drugging persons in order to facilitate theft, was found to contain a resinous substance, which, when separated and given to a dog, caused distinct narcotic symptoms

Symptoms.-Some persons exhibit great susceptibility to its action fractional doses, even as medicine, producing alarming symptoms of floating up into the air 2 Hemp acts on the brain, causing usually excitement, followed by narcotism During the stage of excitement, the individual is the subject of hallucinations, usually, but not invariably of the pleasurable, and often of a sexual character In this stage the patient may show no outward indications of excitement, or he may be constantly laughing, singing, or talking, or furiously delirious animals, it shows itself by a swaying movement of head and body This stage is followed by one of narcotism usually with diluted pupils Commonly, there is tingling and numbress of parts of, or over the whole body, or in severe cases general an esthesia may be present

Detection.-The active principle of cannibis is generally considered to be a resmoid body, cannabin In addition it contains a volatile oil, and from recent researches apparently. also a volatile alkaloid in minute quantity. Authorities differ on the question of the action of these two last mentioned substances Warden and Waddell are of opinion, however, from the results of their experiments, that both the oil and a volatile, apparently alkaloidal, substance separable by distillation from an alcoholic extract of the plant are mert Cannabis cannot be identified by chemical tests Its recognition, therefore, in a medico-legal inquiry must depend on the physical characters of the plant, and its physiological action

(a) Physical character - Dymock describes the leaves as deep green in colour, they "have long petioles and are digitate, with linear lanceolate, sharply serrated leaflets, tapering to a long smooth point" The same author also states "The flowers form erect clustered spikes, often six to eight inches long.

Annalie speaks of datura as a usual constituent of Majun, Hompberger says that it is sometimes used as an adulterant of Majun
 To Christians of Dispensatory
 Pharmaceut Jour, 1885-86

in the drug (ganya) the spikes are compressed flat glutinous and of a brownish green colour, they have a peculiar narcotic odour

According to Dr S N Ridley the following churacters of Indian hemp are peculiar (1) The leaves are small narrow and serrited. The serritions are pointed and the leaves are covered with hurs including the free margin. (2) When the hemp is fissh and in good condition each hair is seen (when examined with a lens) to 10 terminated by a lump which may be of a golden colour (3) The seeds are covered by a loose hust, the outer surface of which is marbled in a characteristic way. If young the seeds are of pale fawn colour with no marbling. In good ganja the seeds should be grey with white marbling mixed with a certain amount of pale young seeds. If too old the appearance is similar but there is a larger proportion of fully mature seeds. The leaves are in this case in bad condition and withered in good ganja some of the buds are still compact and unopened. If fresh and in good condition ganja has a peculiar musty smell and taste.

(b) Phisological action—I ortions of the drug if available may be administered to a dog or food sweetment etc supposed to contain craniabs may be digested with alcohol the alcoholic solution filtered and concentrated. The resin may be then precipitated by the addition of water separated and administered to a dog.

Use of cannabis as an intoxicant.—This is widely prevalent in India the drug being either smoked (ganya smoking) or swallowed. Insanity in India is often attributed to indulgence in cannal is (see p 369) Chevers remarks that it is a matter of popular notoriety both in Bengal and the North West Provinces that persons intoxicated with ganta are halle to commit acts of homicidal violence. In some cases of homicide committed or alleged to have been committed while under the temporary influence of cannabis one person only has been attacked Usually, however the victims are numerous the case assuming the form known as running amok (see p 657) Cases of running amok however have been reported in which the criminal has been under the influence of an intoxicant other than cannabis (see Case p 370) and also casis in which the criminal does not appear to have been under the influence of any intoxicant. In running amok cases whether while under the influence of an intoxicant or not, usually the first individuals injured are persons with whom the criminal is at enmity Commonly when acts of homicidal violence are committed while under the influence of an intoxicant, some motive is triceable for the crime. In some cases the motive will, on inquiry, be found to have pre existed the intoxication, and when this is so, there often appears to be reason to suppose that the intoxicant is taken by the criminal with the object of nerving himself for the deed. In other cases, the motive, such as it is, apparently comes into existence subsequent to the commencement of the intoxication. As already pointed out, the question of criminal responsibility for acts done while in a state of intoxication, is not affected by the nature of the intoxicating agent. Hence as 85 and 86 of the Indian Penal Code apply with the same force to cannabis intovication as they do to alcoholic intoxication. Indian hemp is sometimes administered with criminal intent in tobacco, a pipe or 'huka' of which is offered to the victim.

Cases - Homicidal violence committed while under the influence of cannabis (Chevers, Med Jur, pp 790 et seq)—(a) "Madar Buksh, of Mirzapore, hacked his wife to pieces, inflicting twenty two wounds with a sword probably under the influence of realousy. He confessed the crime, saying he suspected the woman of infidelity and that before his return home on the fatal night a man gave him a pill to cat, it was majun or bhang, and very powerful The person named demed altogether that he had given the pill to the prisoner The judge thought it not improbable that intoxication was resorted to purposely to gain heart for the deed which was meditated -(b) "One humla, a burkundauze of Bulandshahr, killed without any evidence of sufficient provocation two boatmen who were ferrying him across the river The Sessions Judge believed that having been at a religious festival at Belown, the prisoner had probably in lulged in bhang, or some into ucating liquor, and being temporarily excited was irritated by the slowness of the men He was sentenced to death -(c) Three sepovs went over from Bhurtpur to witness the religious ceremonies at Gobardhan Suddenly and, as far as could be ascertained without any provocation, one of them drew his sword decapitated first one of his comrades, and then three women entirely strangers to him His defence was that he had taken bhang, and was beside himself Before the magistrate he had sud that the man whom he had killed had threatened to strike him. At the time he committed the act he apparently showed no signs of intoxication

Cases — Running amok.—(a) (Chevers Med Jur. p. 792) A Moham medan khalasie, excited by pealousy of his wife, apparently determined to revenge humself on mankind in general. He seized a sword, rushed into the street, and attacked overy one he met. Before he could be secured he had killed two children and wounded, more or less seriously, two other children and seven adults —(b) (bid. p. 791). A havildar in the Kumson battalion white seaked in the order's room with other nature of the contract of the contract of the contract of the contract of the contract of the contract of the corps. It was alleged that deceased had debauched the prisoner s wife.

Wormseed -The unexpanded flower heads of Artemisia maritima and other species NO Composite Kirmant-oug (Born ), used in medicine as a vermifuse, contain 71 to 2 per cent of santonin a crystalline principle to which their activity is due Cantonia is the anhydride of santonic and, and is administered medicinally in doses of two to five craims Large doses of warmseed or of santonin give rise to samptoms of irritant possoning accompanied by dehrunn or convulsions followed by stupor The pupils are dilated, and a peculiar disturbance of vision, owing to which everything appears at first blush and afterwards yellow or greenish yellow, is a constant symptom Taylor 1 quotes a case where 155 grains of wormseed proved fatal to a girl aged ten, and Chevers 2 mentions two cases, in each of which three grains of santonin cause l Treatment, general as for cerebral serious symptoms in children poisons Detection -From organic mixtures santonin may be extracted by a process similar to that employed for plumbagin, using chloroform unstead of other as a solvent. When dissolved in slightly diluted sulphume acid, and the solution warmed, a red colour, passing into purple, and finally into brown, is produced by the addition of ferric chloride solution

Wormwood -The leaves and tops of Artemina absinthum, NO Composite, and probably of other species of artemisis contain a bitter principle (absinthin) and a volatile oil The latter is a narcotic poison, causing stupor, convulsions, and dilated punils. In one case half an ounce of the oil caused very severe symptoms in a male adult Absinthe, a French liqueur, contains oil of wormwood and when taken in excess gives rise to loss of intellect, paralysis and epileptiform convulsions combined with the usual effects of chronic sleoholic poisoning Tansy .--Tansu. Tanacetum vulgare, NO Composite contains a volatile oil possessing apparently a similar action on the system to oil of wormwood Woodman and Tidy's mention two cases of poisoning by Tansy, taken with the object of causing abortion. In both cases come supervened, but in neither was miscarriage produce! One of the two terminated fatalls. Conaria myrtifolia.—A few cases of poisoning by the bernes and leaves of this plant-a native of Europe-have been reported, the symptoms being come convulsions and dilated pupils. In one case an adult died in twenty four hours from eating fifteen of the berries. In another an adult died in four hours from swallowing an infusion of senna leaves that had been adulterated with the leaves of this plant. and Taylor " mentions a case where a whole family in I rance was poisoned by cating snails that had been fed on the leaves an I young shoots Camphor -Common or officinal, or Laurel Camphor, Kafar (Hind ) Karuppuram (Tam ) Kapur (Bom ), Kapur (Beng ) is a volatile crystalline substance obtained from the Cennamomum camphora or Laurus camphora, NO Lauracce Its chemical composition is represented by the formula Inother variety, Borneo camphor, from the Dryobalanons aromatica NO Dipterocarpece, has the composition Camphor is administered medicinally in doses of one to ten grains. In large doses it acts as a roison, causing excitement and delinium, with dilated pupils and some tipes convulsions Several cases of poisoning by camphor, nearly all of there non fatal, are on record In one case thirty grains caused furnous dolrium in an adult, and in another twenty grains, swallowed in solution by an luit caused severe symptoms Recovery has been reported from a dose & 160 grains, and in another case from a dose of 270 grains

Taylor Physons, p 692 Med Jur, p 293
Woodman and Tidy, For Med., p 293
Porvons, p 169

#### Poisonous Mushrooms.

Certain species of mushrooms are non-poisonous and are used as articles of food Others are poisonous, and cases of accidental poisoning occasionally occur from one of the poisonous being mistaken for an edible variety Poisonous mushrooms have the following characters -Unlike nonpoisonous mushrooms they have a bitter, astringent, acrid, or salt taste, and on section and exposure change colour, a brown, green or blue tint developing on the cut surface The symptoms in mushroom poisoning may be those of irritant poisoning, or those of cerebral poisoning, or both sets of symptoms may be present. Prominent cerebral symptoms in mushroom poisoning are excitement and intexication, convulsions delirium, and stupor, with dilated, or in some cases contracted, pupils the better known poisonous varieties, one, the Amanita mus aria, or fly blown ageric, appears to owe its activity partly to an undiscovered substance destroyed at the temperature of boiling water, and partly to an alkaloid called musicarine Muscarine taken internally causes contraction of the pupils, 1 hence this condition is present in cases of poisoning by Amanita muscai ia 2 Atropine appears to be to a great extent antagonistic in its action to muscarine, and is recommended as an antidote A curious fact about poisoning by Amanita muscaria is that it renders the urine intoxicating, and in Kamschitka where this fungus is used as an intoxicant, individuals are in the habit of drinking their urine so as to renew the intoxicant Cases of poisoning have also been reported in Europe from the common morelle The poison of this variety appears to be soluble in boiling water, and volatile and to disappear when the morelles are cooked or dried Poisonous mushrooms are to be met with in India. Chevers mentions a case of mushroom poisoning which occurred at Jessore in 1853. Treatment.-Emetics followed by stimulants, warmth to the surface, and hypodermic injection of atropine in one fiftieth gram doses

# Poisonous Food-grains.

Various cereals affected with ergot and diseased maize (pelligra) become poisonous, as has been already mentioned Cases of poisoning also have arisen through the eating of

Lauder Brunton's Pharmacology p 187

cortain poor grains and jungle peas, especially in times of famine resulting in spastic spinal paraplegic affections with polyneuritis which have been broadly classed as Lathyrism or Ben pranlysis' in Turope so cilled after the particular genus of peas or vetches most commonly causing these symptoms though similar disturbances result from eating certain grisses and other plants. Cases of this kind of poisoning are most common in the Curtril Provinces including Chota Nigpur and in the outer Himalayris. When mixed with three Jourths of wheat and cooked as pottage or bread it is apparently harm less, but cooked entirely itself it acts as a poison. The possoning may be in endelenic form

Lathyrism—The continued consumption of Lathyrus satira (Krv are dhad or Itora) and other species of vetch such as L ciccia, has given rise in Italy Algiers Abyssina as well as in Sind Chota Nagmur the Central Provinces and

elsewhere in India, to epidemics of spratic paraplegia

The onset is in many cases saiden. The printing wake up fieling mans in the loins and calves and an inability to move his legs. The lower limbs assume the rigid chelracter of spristic paraplegas (lateral selecosis) and in severe calves may proceed to complete paraplega. The knee jet, is greatly exaggerated, ankle closus is generally readily obtained and in severe cases is caused in progression when the weight of the body is brought to bear on the ball of the toes. A slight tap may throw the legs into severe clones pasm. Implial and transitory paralysis of the bladder has been described but was not noticed in any cases.

Beyond the initial backache, etc there is no sensory disturbance divre is no muscular atrophy except such all arises under the famine conditions which may have forced the matient

to resort to a diet of pessare

Tho head upper part of the trunk and upper extremutes are not affected, so that late in the disease when the rigid 1 gs are useless for progression the patient drags or pulls himself along by means of a lathic grasped in the hands or in other cases squarts in a metal beam and rows himself about with clogs little in the hands.

Lol um temulentum Darnel or Beardel Darnel thataki ([Pan]) Med ni ( WP).—A isw cases of poisoning mostly not offer have occurred both in India and in Europe due to the consumit in not dread etc made from grain containing darnel seeds. The symptoms of thereis

<sup>&#</sup>x27; For an old account of its wide prevalence see Colonel Sleem in a Ros tible.

Dr Irving (vide infra) reported in 1857 that in one district of Allaba had division 6 per cent of the population were affected

posoning are chiefly giddiness, with tremors of the inuscles and dilated pupils, followed by stupor. Irrituat symptoms may also be present Christison mentions three European cases of mass posoning by Daruel affecting respectately eight, seventy four, and forty persons, all of whom seem to have recovered. Similar cases have been reported as occurring at hill stations in the Pani band N W Proinces. The precise nature of the poisonous principle of darnel is unknown. Identification—Accord ing to Hassall, the started granules of darnel are polygonal, like those of rice, but much smaller. The structure of the testa, also, in the main resembles that of rice, differing, however, in the fact that in darnel the outer cost consists of a single layer of broad cells disposed transversely, and not of narrow transverse fibrea as in rice.

Paspalam scrobiculatum, Kodra or Harth 1-Cases of poisoning are occasionally met with in India arising from the consumption of this gram as an article of food The symptoms of hodra poisoning are very similar to those of poisoning by darnel, namely tremors and twitchings of the muscles, giddiness and seeming intoxication, with impaired vision followed by sopor, and accompanied in some cases by irritant symptoms Kodra poisoning occasionally ends fitally thus in a case reported to the Bomban Chemical Analyser, from Godhra, in 1879-80, four persons, viz a man and three children, were possoned by eating bread made from kodra flour, and one of the children died hodra appears to be only occasionally poisonous, according to popular belief in fact, it is sup posed that there are two varieties of the grain, a sweet and litter variety (Goraharik and Majara harik or Mena Kodra), of which the latter alone is possonous As is the case with Darnel the precise nature of the poisonous principle present in kodra is unknown be like, however, are the symptoms of ke ira to those of darnel poisoning that it has been suggested that so called Kodra poisoning is really Darnel poisoning, arising from accidental mixture of Darnel with the grain bix cases of such poisoning by hodra bread are reported in the Ind Med Ga. of 1919, p 379

Maize poisoning.—This condition, which has been called 'Zeism,' produced by defective maize, appears to be Pellagra

Certain of the poisons already described under Vegetable Irritants act also on the brain. Thus stuper or incensibility with dilated pupils has been observed in poisoning by Tylophora //assculata, Daphine mererum, Laburnum, and Yew. Cerebral symptoms also present in cases of poisoning by Cocculus indicus and the fruit of Terminalia bellerica. Lastly, it may be mentioned that cases have been met with in India (chiefly among children) which tend to show that the kernols of the fully developed seeds of star-anise, Micram aniswum, possess a narrotic action.

Dr G Watt Ind Med Gaz 1895

#### CHAPTER XXIX

#### SPINAL POISONS

UNDER this head may be grouped a few of the neurotic poisons which act mainly on the spinal coul. This action may be stimulant in claracter or tle reverse. If stimulants the result may be production of intevolar spasin as in six chimic poisoning, if the riverse parallysis or loss of sensition is suits. Cerebral symptoms are as a rule either absent or slight and death nearly occurs by asphyrat due to arrest of the movements of respuration. This arrest may us in strychnine poisoning be the result of spasin but is more commonly due to pranly six though calabar bean slows the action of the heart and so may cause death by syncome.

General indications of Treatment should be (1) Elimination by gring for the or using the stomacl pump, (2) prevention of action by administration of animal clarocal or of gallic acid or tuning or decections containing tannin, (3) counteraction of effects by treatment of the symptoms as they arise \(\ell \) a liministration of stimulants to counteract depression employment of artificial respiration et. Certain drugs more or less antagonize the action of some of the Joisons of this order and are recommended for use as physiological antidotes thus in strychina poisoning inhalation of chloroform is specially indicated

Spinal poisons may conveniently be divided into (1) those which specially affect the cord or central poisons and (2) those which primarily affect the peripheral extremities or trunks of the nerves or peripheral poisons. The central spinal poisons include strychime cal-bar bean and gel emium, of these the first existes and the other two paralyse the cord.

# Nux Vomica and Strychnine

Strychnine or strychnin is one of the most deadly of known poisons. It is contained in several plants common in India

belonging to the genus Strychnos of the NO Loganiacae, together with another poisonous alkaloid of similar action, but milder in degree, named brucine.

These two alkaloids are contained in nux vomica, in combination with strychnic or igasuric acid probably identical with make acid Strychnine

and brucia have been found present in -

1 Strychnos Nux Yomee, Kuchila (Hind.) Kajra (Bom.) Pittli Kotlia (Tam.) The seeds of this disc shaped, are officinal and the sket is met with in commerce under the name of "false angostura bark. All parts of the plant are bitter and poisonous" S. Estychnos Ignatii, Taprila (Hind and Bom), Kajapprinolita (Tam.) The seeds of this are known as Faba amara and St. Ignatius beans. 3 Strychnos colubrans, Snake tool Naga musa li (Tel.) Undara camiran (Mal.) Kuchila lata (Hind.), Goagari lahri (Bom.) Kajarual (Mar.) 4 Strychnos Tieute, the Upas tree of Java and a noted arrow poison

Strychnos toxifers belonging to the same genus is believed to be the chief source of curari (which see p 712) beveral species of strychnos



Fig 60 - Yux Vomica 3ths naturalisize

Surface wi b raphe
 Longitudinal section showing albumin and embryo.
 Transverse section showing central cavity

are non poisonous of these the most important is the Strychnos pota torum, Nirmali (Hind) Tetrankottai (Tam), Nirali (Mar), the seeds of which are used under the namo of clearing nuts for clearing muddy water They are subglobose half or less the diameter of nux vomica brownish erey in colour and not bitter

In India, poisoning by nux vomica is occasionally met with, the cases being generally suicidal or accidental

Among the causes leading to accidental poisoning may be mentioned, (a) The practice of nux vomice eating, which to a certain extent prevails in some parts of India, and (b) The substitution of nux vomice or Fuchida batk for other barks, notably for Lurch; or holarrhena antidysenterica bark, a drug in common medicinal use in India as a tonic and antiperiodic for children, and as an astringent in dysentery. In a case which occurred in Calcutta in 1882 the death of a child was traced to this substitution, and in a subsequent case on a vendor's stock of holarrhena bark being seized, about one-fourth of it was found to consist of nux vomice bart. Waddell suggests that

this substitution may partly account for the great mortality among infants and children yearly reported from tetanus in Calcutta  $^1$ 

Poisoning by the alkaloid Strychune, formerly rare in India has of late years become more frequent, owing to the greater ease with which the alkaloid can be obtained. It is usually accidental in the Bombay Presidency, strychime powders have of late years been largely supplied to the police for the purpose of destroying dogs, and several cases of poisoning of human beings by strychimic have been reported, in which the poison was obtained from this source. Accidental poisoning has occurred through prescribing Laquor Strychime along with its incompatible Liquor Arsenicalis, when the alkaloid is thrown down forming a poisonious dose at the bottom of the bottle. It may also occur from the deposit in the last few doses in bottles of Laston's Strup.

Action, symptoms, etc. - Strychnine acts as a direct stimulant to the spinal cord causing tetanic spasins and death either from asphyxin due to spasm of the muscles of respira tion, or from collapse occurring in the interval between the spasms When swallowed (except when taken in the form of a pull) the first thing noticed is an intense bitter taste and dryness of tongue, thus is frequently but not invariably suceceded by a feeling of sufficention and want of air Twitchings and cramps follow, rapidly developing into intensely punful tetanic spasms, affecting nearly all the muscles of the body During the spisms, the body frequently becomes rigid, and arched so as to rest only on the head and the heels (omsthotonos) During the fits of spasm also, the pupils are usually dilated and the features drawn into a grin (risus sardonicus) The fits of tetanic spasm alternate with intervals of muscular relaxation, the relaxation being as a rule complete. As the case progresses towards a fital termination, the intervals between the spasms become shorter and shorter in duration The convulsions may be so severe as to stimulate bruises see Case (d), below There is no narcotism but insensibility from exhaustion may occur before death

Case (a) —Strychnae pousoning, homicidal —Neill Cream tragedy —In October 1892 Neill Cream was convicted of the murder in London of Mattila Eclover and there was good evidence that he also murdered Marsia, Shrivell and another young prostitute, and attempted the life of another to whom he gave on the street some pills to take but she threw them away The criminal had ten with Marsh and Shrivell on the night of April 11th, 1892 and even the more than 18 Half an hour atter

<sup>1</sup> Ind Med. Gar, March 1885

Cream left them they were found to be dying, and died within air hours From Marsh a stomich seven grains, and from Shrivell's nearly two grains of strychinne were separated, so that each pill probably contained at least three grains of strychinne The body of Clover, exhumed six months after death, contained the same poison.

Gase (b)—Strychnuse posoning, homicidal—Palmer case—Win Palmer, gard 11, a surgeon, in Stafford-bure England, was charged in 1856 with the murler of John Cook Palmer, who was deeply in debt through racing matters, was under suspecion of having poisoned both his wife and brother in 1854 and 1855, their lives having been heavily insured by him He was also heavily in debt to Cook, who was under his treatment for a core throat. Cook was attacked by consting and burning pain in stomach immediately after draining octific-standed him by Palmer, and some of the soup given by Palmer was supped by the chamber maid, who also was seized with vonting. A few days atterwards, on the 19th, Palmer purchased three grains of strychime, and gave two more pills, after taking which Cook was seized more strychime, and gave two more pills, after taking which Cook was seized with setamic courvisions and died. At the post mortem commission I and the staning course of the continuous control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the railway. Although no poson was found in the stomach, the cureusstantial evidence, was so strong that he was convicted and hanger.

Fatal period, etc.—In posoning by strychnine, the symptoms usually appear in five to twenty innuites, in posoning by nux vomica the appearance of the symptoms is less ripid, and in one fatal case their appearance was delayed for two hours. Death may occur in ten innuites or be delayed for five or aix hours. Of thirty five cases collected by Woodman and Tidy, nineteen died in an hour or less, and eleven more in one to three and a half hours.

Diagnosis from disease.—The chief points of distinction between strychnine poisoning and tetanus, the only disease likely to be inistaken for it (though epilepsy might be confused with it also), are

(1) In poisoning the symptoms come on suddenly, rapidly become severe, and soon end in either death or recovery, in tetanus, as a rule, the reverse is the case. Chevers, however, mentions an exceptional case of sudden accession of tetanus, and death in the first spism (see Case below) (2) In tetanus, the muscles of the lower paw are early affected, stiffness of the lower paw being often the first prominent symptom, in poisoning, the nuscles of the lower paw are the last to be affected. (3) In poisoning, as a rule, the muscles during the intervals are completely relaxed this is not so in tetranis. The possibility of mistaling the nipures contracted during the violent spasms for homeicald bruises should be considered.

Core—Sudden death in first spanned Tehonus (or Epilepsy).—Chever under this heading cites the following case. 'An apparentify healthy boy, one of the jupils of the La Martindre School Calcutta was acated on his bed having a small sore on his foot diresed by the native decided Having applied the dressing the native decide was leaving. He walked straight to the door but as he was passing out he heard a noise from the bed Turning he saw the low supported on his occupit and heels, body as and death was immediate.—Mrd. Jur. n. 218 of he bed, the

Treatment.—Administer emetics or use the stomach pump, chroroforming the patient so as to allow of the introduction of the tube. Give animal charcoal or infusions containing tannin Administer chloral, or still better keep the patient under the influence of chloroform.

Post mortem signs —Not characteristic, as a rule, the body is relaxed at death, sometimes, however, it remains rigid, the rigidity continuing for a very long period. The brain spinal cord and lungs are usually found congested, the heart may be empty or full. The convulsions may have been so severe as to bruse the body.

Fatal dose, &c .- (a) Of Strychnine A medicinal dose of this is one thirtieth to one twentieth of a grain Taylor1 estimates the fatal dose for an adult at half a grain to two grains. Some persons appear to be specially sensitive to the action of struchning, and two cases are on record in which respectively one twelfth and one sixth of a grain caused alarming ayuntoms In both these cases the subjects were adult females. The smallest quantities which have caused death are one sixteenth of a grain in a child two to three years old, and half a grain of the sulphate in an adult 2 Recovery has been recorded from doses of ten to twenty, and even forty grains of the alkaloid " (b) Nux vonuca - Nux vomica seeds contain about a quarter to half per cent of strychnine, and St Ignatius' beans about one and a half per cent.4 The medicinal dose of powdered nux vomica seeds is two to three grains. In one case thirty grains of powdered nux vomica seeds (equal to about one full sized seed) taken in two doses of fifteen grains each, caused the death of a girl aged ten, and in each of two cases death was caused by fifty grains 5 It should be noted that owing to the insolubility of the testa, whole nux vomica seeds may be swallowed, and pass through the body, without giving rise to symptoms of poisoning

<sup>1</sup> Poisons p 718 Case of Dr Warner 15 , p 712,

Woodman and Tidy, For Med 1 330 Plarmacographia pp 480 433 Taylor, Poisons p 698

Influence of habit — Many authorities state that in different parts of India nux vomica is habiturally eaten (like arsenie) as a stimulant and aphredisiae Baker quoted by Chevers¹ states that those who practise this habit begin with one eighth of a grain of the seed gradually increasing the dose to about twenty grains. If this is so the inference of course is that habit tends to confer on the system a resisting power to the action of strychinne. It is however undoubtedly the case that small doses of strychinne repeated at short intervals tend to exert a cumulative effect. Lauder Brunton in fact states that strychinne is a cumulative poison and points out that this effect is due to the slowness with which it is excreted one effect produced by it being to contract the renal vessels and thus interfere with its own elimination.

Unusual cases — Harley 2 records a case where an infant at the breast suffered from symptoms of strychnine poisoning the result of the medicinal administration of strychnine to the mother who remained unaffected Dr Chatteijee 3 met with a non fatal case resulting from the introduction by a quack of a pulp made from nux nomica seeds into a wound. Blyth 4 mentions a case of attempted suicide by a young woman who took about one and a half grains of strychnine and two ounces of laudanum Severe symptoms of narcotic poisoning followed but no symptoms of strychnine poisoning showed themselves until eight hours afterwards

Preparations (1) Officiand —The following preparations of nux vomice are contained in the IP —

	Strength	Med clust dose
Infusion Tincture Extract	1 to 48 2 ozs to 1 pint 1; oz equals about 1 lb of the seeds	½ oz to 1 oz 5 to 20 drops 1 of a grain to 9 grains

The I P also contains a solution of strychnine strength four grains to one ounce or about I to 109 (2) Nonoficinal—Various vermin killers sold in England contain strychnine Blyth mentions the following—Millers rat powder a mixture of one ounce of nux vonice to one pound of oatmeal, Battles a vermin killer a mixture of strychnine with flour and Prussim blue containing about 77 per cent of strychnine, and Butlers vermin killer, a mixture of strychnine with flour and soot stremm killer, a mixture of strychnine with flour and soots.

Wel Jur p 241 Woodman and Tdy For Medic Toll Ind Med Gaz 187° p 2-1 Loisons p 13 MEDIC

sometimes Prussian blue, containing from about  $3\frac{1}{4}$  to 5 per cent of strychnine

Identification .- Nux vomica seeds (see Fig. 60) are contained in a smooth orange-coloured berry about 2 inches in diameter, and containing about five seeds or "nuts" The seeds are in shape nearly circular discs, slightly concave on one side, and convey on the other, about one inch in diameter, by about a quarter of an inch thick. In colour they are light crevish, and have on the surface a silky appearance, due to their being thickly covered with short hairs. In the centre of the concave side is the hilum connected by a slightly elevated raphe with the chalaza, which forms a small protuberance on the edge in the neighbourhood of the radicle (see Fig 60) They are very tough and horny and have an intensely bitter taste St Ignatius' beans are about one and one fifth of an inch in length, ovoid, but presenting three to five flattened surfaces due to mutual pressure "In the fresh state they are covered with silvery addressed hairs, portions of a shaggy brown epidermis are here and there perceptible on those found in commerce, but in the majority the seeds show the dull grey granular surface of the albumen itself' 1 Nux vomica bark occurs in quilled twisted pieces, an inch or less in diameter, thin, light brown in colour, and marked on the outer surface by numerous small light coloured elliptic corky warts. Its inner surface is turned red by citric acid 2 this distinguishes it both from angostura or cuspara bark, and from holarrhena antidysenteria bark, the latter also is much thicker, and is marked on the external surface by scars of exfoliation

Detection.—Strychinue occurs in commerce as a white powder, or in white rectangular prismatic crystals, but may be obtained in other crystalline forms eg hexagonal prisma, octahedra, or forms derived from the octahedra. It is freely soluble in chloroform (I to 7 or 8), less soluble in alcohol (about 1 to 100), and still less soluble in either. It is only very sparingly soluble in pure water (about 1 to 7000 of cold witer), sparingly soluble in pure water (about 1 to 7000 of cold witer). The control of the subject of the subje

1 Nitter taste. 2 The colour test —This depends on the fact that a play of colours, namely, blue, rapidly changing to

<sup>&#</sup>x27; Pharmacographia p. 383
Owing to the presence of brucine (see p. 65.)

violet, and then slowly to purple, and lastly, to red, is produced when strychnine is subjected to the action of nascent oxygen. To apply the test, stir a minute quantity of strychnine with a drop or two of strong sulphune acid, the strychnine dissolves if pure without change of colour. Then cautiously add a minute quantity of manganese dioxide, or lead dioxide, when the play of colours appears. Potassium permanginate, or potassium dichromate, may be used instead of manganese or levid dioxide, but are not so suitable, or the test as proposed by Letheby may be conducted galvanically. In this modification, the strychnine, dissolved in a drop or two of strong sulphune acid, is placed on a piece of platinium foil connected with the positive pole of a galvanicality.



Fig. 61 -Strychnine crystals × 120 Obtained from an alcoholic solution



Fig 62 -Strychnine + potash or ammonia × 30

the negative pole, the play of colours appears. It has been objected that various substances, eg pyrovanthin, piperine, salicine, bile, etc., become coloured when treated with strong sulphuric acid With these substances, however, the colour appears directly the acid is added, while with strychnine no colour appears until after the addition of the manganese dioxide. or other oxygen yielding substance Aniline salts, Woodman and Tidy point out, are not coloured by sulphure acid only, but give a play of colours when manganese or lead dioxide is added, with aniline salts, however, the colours are first "green, then a very persistent blue, then black ' 3 The physiological test -This consists in administering, preferably by subcutaneous injection, a little of the suspected alkaloid to a small animal, eg a frog, and observing whether or no tetanic symptoms are produced Substances other than strychnine induce tetanic symptoms, the physiological test is only useful as a negative test, to prove the absence of strychnine. or as a confirmatory test If, however, definite chemical

evidence of the presence of strychnine has been obtained, the physiological test is quite unnecessity 1

Brucme.—This alkaloid also has an intensely bitter taste. Its physiological action is the same as that of strychinne, but seven to ten times weaker. It is less soluble in ether, but more soluble in water, alcohol and ellotroform, than strychinne Unlike strychinne, it gives no play of colours with insecent oxygen. The special colour test for brucine, a test to which strychinne does not reviewond, is as follows. Add a little strong nitric acid, a bright red colour is produced, which, on warming becomes yellow. If, after warming a true of stamous chloride be added, the yellow changes to purple, destroyed by excess of stamous chloride or of intric caid.

From organic mixtures, strychnine and brucine may be separated by Stas process, using chloroform or a mixture of ether and chloroform as a solvent. If both are present, the alk-loridal residue will respond both to the nitric acid test and the naccent oxygen test. The discovery of both, in a case of poisoning, indicates that probably portions of a plant contaming the alk-loids e.g. mix vomes, have been employed

Failure to detect strychnine.—Strychnine is an extremely stable substance, not likely to be destroyed by putrefaction Richier? Jound it in putrol tissues after eleven years exposure to decomposition in open vessels. Elimination also of strychnine from the body is comparatively elow. Hence, given that the analysis has been properly conducted, and that a safficient quantity of material has been submitted to analysis, failure to detect strychnine in the body is strong evidence against death from strychnine poisoning. It is not, however, absolutely conclusive evidence against this supposition as its just possible that if death has occurred from a minimum dose of sitychnine, and the pritent has lived for some time after its administration, complete climination of the poison may take place before death

Stimulation of the spinal cord is caused also by Thebar, one of the opium alkalouds, this, however, is less active even than brucia. It is also caused, according to Lauder Brunton, by Galabarine, one of the alkalouds of Calabar beam. Spams, more or less tetane in cluracter, pointing to a stimulant action of the cord, have been observed in poisoning by Nerium odorum. Stimulation of the spinal cord resulting in the production of epileptiform convulsions, is one of the effects of Pierotovin, the active principle of Occubian sindium, and Blyth mentions as

Blyth, Poisons p 829

<sup>\*</sup> Ibul , p 321

similar in its action to picrotoxin the poison of *Hiscium reli-*giosim, a plant growing in Japan Venous blood it may be
here noted irritates the nerve centres, hence in naicotic
poisoning and poisoning by dru<sub>o</sub>s tending to cause death by
asphyxia convulsions may precede death even when the
poison itself has no irritant action on the nerve centres

Calabar bean -The seeds of Physostyma renosum NO Leguminosa a native of Western Africa Physostiamatis semina Calabar beans are highly poisonous A dose of twelve grains of the seeds taken for purposes of experiment caused alarming symptoms in an adult. In 1864 a number of children were accidently poisoned at Liverpool by enting the beans one who had eaten six beans died, and two who had eaten the broken fragments of the kernel of one bean suffered severely, but recovered Calabar bean paralyzes the spinal cord, slows the action of the heart and causes death by paralysis of respiration. In experiments on animals large doses have been found to at once arrest the heart's action and cause death by syncope In poisoning by Calabar bean the prominent symptoms are gastric irritation slight tremors followed by great weakness of the muscles and slowness of the pulse and of respiration. The mental faculties are unaffected pupils are contracted but the poison appears to act more power fully on the pupils when locally applied than when swallowed Three alkaloids are described as present in Calabar bean viz physostigmine eserine and calabarine Of these the first two are considered by many to be identical with one another and are apparently the constituents to which the paralyzing action of the poison is due Calabarine according to Lauder Brunton causes convulsions like strichnine Treatment -General, as for spinal poisons (p. 651) Both atropia and chloral to a certain extent antagonize the action of Calabar bean and have been recommended as physiological antidotes The antagonism is in neither case complete but appears to be greater in extent with chloral than with atropia Identification -The beans are kidney shaped chocolate coloured externally and have a broad black furrow with raised edges lighter in colour than the rest of the surface running along the convex border Dimensions about 1 to 11 by 2 by 1 an meh, weight about sixty seven grains Physostigmine may be extracted from organic mixtures by Stas' process using benzene as the solvent and identified by its action on the pupil and by the red colour given by its sulphate with bromine water

Gelsemium —Gelsemium nutid im (syn G seripervirens) or vellow lasmine NO Logan acce. The dried rhizome and rootlets of this

oftennal BT (1885), are used in medicine. In overdoses, the drug paralyzes the cord, and causes death by paralysis of respiration. Unlika Calabar bean, gelsemum has no very marked action on the heart

Its active properties appear to be due to the alkaloid gelemented wormley estimates that not more than one such of a grain of gelesemine was contained in a dose of the drug which proved futal to an adult female. The fatal cases of prosoning by gelsemine have been reported? The prominent symptoms are muscular weakness followed by guidaness, frontal headache, double usion and symuting. The weakness depens note paralyses the cyclic's drop, ruson, becomes imistinet, and the muscular power of speech is loss? Respiration becomes slow, and the surface coll. The mind remains unaffected. The pupil is usually contracted but Ruger points out that gelesemine when locally applied, causes illustration of the pupil, or a reverse effect to that produced by internal administration of the drug. Detection—Custemine may be the solvent. The colour tests for it are: (1) with sulphure, acid and manganese dioxile is gives a damask rel colour changing to a rich green, most mythed at the edges, and (2) intre acid striks with it a browneh green, quarkly changing to deep green.

Paralysis of the cord is also the special action of methylcoma, a liquid volatile alk-load alhed to coma (see "Comum"); and ulcain, a powerfully possiones alkaload contained in Gorse (Ulca curopou) is said to piralyse the motor tract of the cord, and the trunks of the motor nerves

A According to the B P (1985) the medicinal dose of the dried root is five to thirty grains, and of the fincture—strength one to eight—five to twenty minims

Nharton and Stille (1884) Vol III . p 416

#### CHAPTER XXX

## CEREBRO-SPINAL POISONS, CARDIAC, ETC.

## Cardiac Poisons.

Or the poisons which act more or less directly on the heart, through a direct action on its nerve supply, Tobicco and Lobelia are spiral as well as cardiac poisons, and cause death by asphyvia due to paralysis of the respiration, whilst Digitalis and Oleander appear to act directly on the cardiac muscle, thus tending to arrest the heart's action and cause death by syncope Like spiral poisons, cardine poisons leave no characteristic post mortem appearances

General treatment indicated in cardiac poisoning is to try to secure (1) Elimination, by emetics or the stomachpump; (2) Prevention of Action, by giving decoctions containing tannin, (3) Counteraction of Effects, by the administration of stimulants, and the employment of physiological authofal measures, such as keeping the patient in a recumbent position, keeping the surface warm, employing galvanism, and, if required, artificial respiration

## Tobacco.

Micotiana tabacum, Tobacco NO Solanacca, 'Tambalu' (Ind., Beng, and Bom), Pugaulai (Tam)—The dried levices of this plant are officinal BP and L.P., and form the ordinary tobacco used for smoking, etc. They contain a poisonous liquid volatile alkaloid, nicota or nicotane, and also an unimportant volatile crystalline substance micotianin, or tobacco camphor Cases of poisoning by nicotine are rare, one celebrated case is, however, on record, namely, the case of Count Bocarmé, convicted of poisoning his wife s brother, by foreible administration of nicotine Cases of posioning by tobacco, mostly accidental, are more common, Death has resulted from swallowing tobacco, from administration of a decoction of tobacco as an enema, and from swallowing tobrico juice such as collects in

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pipes; and bad symptoms have been caused by the application of tobacco leaves to a wound, and even to the sound skin Death has occurred from excessive smoking, it is doubtful, however, whether tobacco smoke contains mectine, probably its posonous effects are due to pyridene bases, developed during the combastion of the tobacco.

Action, symptoms, etc.-Tobacco first slows and afterwards quickens the pulse, acting on the heart through the vagus, which it first stimulates, and afterwards paralyzes. It is also a spinal poison, and causes death by paralyzing the respiration The prominent symptoms of tobacco-poisoning are giddiness, muscular weakness, funtness, and depression, abdominal pain, vomiting, sometimes purging difficult respiration and convulsions. The pulse is at first slowed, afterwards it becomes quick, weak, and irregular. Death usually occurs rapidly. In one case fatal results followed the administration. as an enema, of a decoction of half a drachm of the leaves Treatment.-Evacuate the contents of the stomach, give tannic acid and stimulants, keep the patient in a recumbent posture, and apply warmth to the surface Blyth recommends cautious hypodermic injection of strychnia. Post mortem signs - Not characteristic, there may be congestion of the brain, lungs, and liver In some cases inflammation of the stomach and intestines has been found Detection .- Portions of tobacco leaf may be found and recognized by their odour and physical characters Nicotine may be extracted from organic mixtures by Stas process as for conium, and recognized by its odour and action on animals There are no special colour tests for micotine. Nicotine does not coagulate albumen, and gives a crystalline precipitate with mercuric chloride solution (a distinction from conia)

Lobels Indian—Lobels montaneyfolis vem. Denoil, Boland, Divinal—This books and process and spons the momentum ranges of deplor and Southern and Western India. The upper portion of the stem's shollow, and is draed and used as a shephera's pipe. The plant has recently been examined, and lound to contain the same active constituents as L sindate Dymock gives the following description of the plant. The leaves resemble those of the tobacco, they are finely serrated and covered with simple hairs. The lower part of the state of the plant is a continued to the state of the portion is a hollow tobe ending in a crowided head of flower spikes, the portion is a hollow tobe ending in a crowided head of flower spikes, the portion of the form the continuers of the portion of the first plant is at which a portion of the fur flower is often althered, the capsules are two celled, each cell containing a field pipeless. The seeds are numerous and very small (non fifteeth of an inch in length), oral, lattened, and marked with deltonte lines. Several small tubercless surround the site of the placental attachment, their ploor is hight brown. The whole plant when dry is

studied with small spots of r. smous evudation, and is hot and acrid to the taste. Action, symptoms, etc.—Similar to those of poisoning by tobacco, except that there is more burning pain in the stomach etc. As in poisoning by tobacco death occurs by paralysis of the respiration. Ten of fitteen grains of the powdered leaves or seeds will act as a strong emetic and a drachm of the powdered leaves has caused death. Treatment should be the sume as in poisoning by tobacco. Post morter signs—Inflammation of the stomach and intestines and congestion of the research of the beau.

### Digitalis

Purple Coxglove or Digitalis purpurea NO Scrophulariacce (see Fig 63) This plant, although a native of Europe is grown in India,



1 1G 63 - Digitalis purpurea

where its active principle is found to be of equal strength to that contained in European specimens (Hooper IMG 1918 481) all parts of it are poisonous. The leaves probably the most poisonous portion of the plant are officinal B  $\Gamma$  and  $\Gamma$  I. Several active principles have been described as present in digitalis, of which the most important are

digitorin, digitalin (a gluccide) and digitalics. Of these, the last is the only one nobuble to any extent in actor. All three are powerful heart passons. They stimulate the cardiac muscle and prolong the contractions of the heart sub-equestity readering the heart's action irregular, and finally arresting it. Of the three digitorin is said to be five to ten times more powerful thin either of the others. Byth estimates that one sixteenth of a grain of digitorin would probably prove fatal to an adult when bolled with distinct acids digitorin pedits conviction and digitaling probably prosonous, but cause convisions the precedure.

Commercial digitaline—Former's the active principle of digitalia was stated to be digitaline. This was officiand in the BP of 1867, but has been cruited from the BP of 1885. Digitaline is still officiand IP beveral varieties of digitaline have been prepared and sold, the chief being—(I) Nativelles ergetalized digitaline containing digitation as its transfer of the still of the st

Poisoning by digitalis is rare and is chiefly due to accidents in the medicinal use of the drug. One celebrated homicidal case is, however, on record viz the case of Dr de la Pommerais a homicopathic practi tioner, who was tried and convicted in Paris in 1864 of poisoning a woman named Faus The case was an assurance murder Symptoms -Digitalis in large doses acts to a certain extent like an irritant poison causing, no matter how introduced into the system nausea, vomiting, and often diarrhosa. Its main action, however is exerted on the heart the pulse becomes slow, the heart's action pregular, there is pallor of the surface and tendency to syncope, and finally the heart's action stors and death occurs Other symptoms of digitalis poisoning are dilatition of the pur ils, disturbances of vision slowing of the respiration, and suppression of urine balivation is often present, and convulsions are occasionally Usually the mind remains clear to the last Sometimes the administration of a series of medicinal doses of digitalis is followed by a sudden outbreak of symptoms of poisoning Digitalis, therefore, is generally stated to be a cumulative poison Preparations and Dose.— Ordinary medicinal doses of the various preparations of digitalis are -of officinal digitaline, one-sixtieth to one thirtieth of a grain, of the powdered leaves, half a grain to one and a half grains, of the tineture BP and IP (strength, two and a half ounces to one pint), ten to thirty minums and of the infusion (strength B P 1885, fifty six grains to one unt. I P sixty grains to one pint) two to four fluid drachms Blyth estimates the maximum safe dose to be of officinal digitaline, 0 03 grain, of the leaves, four and a half grams, of the uncture, forty five minims. and of the infusion, one onnce, or about three tunes these quantities in twenty four hours. The same authority considers that double these maximum safe doses would be likely to prove dangerous A case, how ever, is recorded of recovery after taking one drachm of the powdered leaves, and another of recovery after swallowing two ounces of the tincture Fatal period - Rarely less than twenty two hours. In one

Another principle prevent in digitals viz digitoms, is readily soluble in water, and appears to have an action like that of appears. This action is to a certain extent antagonistic to that of digitoxin digitalers, and digitalin, its tendence being apparently to degrees instead of stimulate the heart's muscle.

case death occurred on the sixth day Treatment—Discusto the contents of the stomach. Give tannic acid and stimulants. Administer acomite cautiously, and keep the patient recumbent. Post mortem signs—Not characteristic. In some cases signs of inflammation of the mucous membrane of the stomach and intestines have been present.

## White or Pink Oleander.

This sweet-scented Olcander 1 is the Nerium odorum, NO Apocynacce, vernacularly known as Kaner (Hind ), Sueth karabi



Fig 64 -- Nerium Odorum &

(Beng ), Aları (Tam ), see Fig 64. The shrub grows wild over the greater part of Indra, and is cultivated in gardens for its

¹ The goat feeds on the foliago with impunity but Dr Watt (Econom Dates) states that it is fatal to camels and other animals and possonors also to meets. One of its SansArit names, as noted by Dr O L Bone, is destroyed of horse assemanala Dr Hongberger was of opinion that the wild hill plant was more possonous than the cultivated variety and he is supported in this opinion by M Latour and Prof L Pelhan who found by careful analysis that the wild variety contained a larger quantity of the poisonous principle—Dr C L Bose, ind Med Gar

graceful flowers. All parts of the plants are poisonous; but cases of poisoning by it are not very often reported. It is also called the 'true oleander' in contradistinction to the 'bastard oleunder. Theretia nerufolia or Cerbera theretia (see p 682)

During the fifteen years ending 1888, fourteen cases of Nerium porsoning were referred to the Chemical Examiner, Bombay, and eleven to the Chemical Fxaminer, Madras, only two cases were dealt with by the Chemical Examiner, Bengal, during the same period. Of seventeen cases, nine were suicidal, two homicidal, two criminal abortions, and in four the poison was given medicinally

For suicidal purposes the root is especially used by women in Western and Southern India and in the outer Himalayas; whilst in Bengal the fruit of the vellow olcander (see p 683) is more often used in this way

For homicidal purposes it is less frequently employed; but the root is commonly used for procuring criminal abortion both locally and internally. The use of the root medicinally by ignorant persons for venereal disease has occasionally led to

fatal poisoning

The active principles of the plant have been investigated by Dr. Chum Lal Bose, who discovered that the plant contains, in addition to the Nerrodorin and Nerrodorein of Greenish,2 another actively toxic principle, which he has named Karabin after the vernacular name of the plant Like Nerrodorin, t is a powerful cardiac poison, acting on the heart in a somewhat similar manner to digitalin, and it also acts on the spinal cord somewhat like strychnia

Symptoms.-Vomiting and frothy salivation usually occurs, followed by restlessness Pulse becomes slow and weak. respirations hurried, muscular twitchings, especially of upper extremities, deepening into tetanic spasms, which (unlike strychnia poisoning) affect one side more than another (thus, see Cases 1 and 2 below, the muscles of the right arm were chiefly affected in one case, and in another the left side) Lockjaw is frequently present. Drowsiness passing into insensibility and collapse. Diarrhoa is usually absent

Cases -- White cleander poisoning-Accidental-Multiple In 1898 two men were admitted into the Medical College Hospital, Calcutta, three hours after taking a cupful of a decoction of the root of Nerium odorum, which they had taken medicinally as an anodyne

'i Vidaximmehan male, ageh about 50 Vomited several times offore and after coming to the hospital . vomited matter consisted of yellowish, frothy fluid. At the time of admission he was quite conscious, and able

1 Ind Med Gas , Aug and Nov , 1901

Pharm Journ., 1831, p 873 The third principle Nersodorem is shown by Dr C L. Bose to be a saponin, with little toxic properties, so may be disregarded

to speak and swallow, complained of no pain in the stomach, pulse small, soft, slow (about 60 per minute), but regular, respirations normal, eyes congested, pupils unequal, the right one being contracted Two hours after admission, drowsiness and twitchings of the muscles of the hands were noticed. An hour after spasms were noticed, most marked in the upper extremities and face, but slight in the legs There was no lockjaw, but dysphagia was a marked symptom, and the patient was unable to speak, although he appeared to understand when spoken to and frequently smiled vacantly Respirations were hurried, and the pulse slow and small, about 50 per minute | Pour hours after admission he began to get tonic convulsions of all the muscles of the body, especially of the upper extre mities, no lockiaw An hour after the whole body was found rigid, and there were lockjaw, twitchings of the fingers and bending of the neck towards the right, froth coming out from the mouth. The pulse was frequent (about 100 per minute) and the respirations hurried (about 70 per minute) About twelve hours after admission the upper extremities were found still rigid, but the lower extremities were flaceid, breathing was hurried and stertorous, and the pulse was frequent and small Rigidity of the muscles began to disappear gradually, but the general condition of the patient became worse The pulse began to fail, the breathing continued stertorous, and the comunctival reflex was lost. The nationt died about twenty six hours after the ingestion of the poison

Post mortem apparamees' Dr Gibbons held a post mortem examina ton about four hours after death, and recorded the following conditions "Rigor mortis well marked, body still warm to the touch. Bight pupil a little smaller than the left. Thumbs resting against fingers. Lungs, adherent behind, and very congested with fluid blood. Heart, right sude full with blood, left side nearly empty, spots of subendocardial humor hange on front wall and towards apex on both walls. Laver, spilen, and fluid and much ances, no meall, stomach in folds with tops congested, mucous membrane congested, especially along the lesser currature. Small intestine contents, yellow mucus, slight congestion of upper part of due denum and a few scattered spots of congestion. I argo intestine bentling forces in Fram healthy. Traches congested, and frotby contained lupud faces.

liquid in the bronchi

2 Mohammedan male, about 28 years of age The symptoms in this case were similar to those in the first case excepting that they were appa rently of a comparatively mild nature there were vomiting, slow and feeble pulse, hurried respiration twitchings of the muscles of the upper extremities, which, however, developed about twelve hours after the inges tion of the poison, as against five hours in the first case unequal dilata tion of the pupils, bending of the head towards the right, general tonic convulsions of the whole body, opisthotonos, lockiaw A movement of the head from side to side was noticed, and there was a slight rise of temperature on the second day of prosoning. Under westment he begin to improve steadily, but remained in a debilitated condition for about three weeks, after which he was discharged from the hospital cured. The treatment in both the cases consisted in giving emetics and alcoholic and diffusible stimulants, mustard plasters over the heart, and hypodermic injections of sulphuric ether. The viscera of the deceased man and the vomited matter of both men were sent to the Chemical Examiner for analysis A narcotico irritant principle was detected both in the viscera and in the vomited matter which produced vomiting, weakness of the heart, general uneasiness and drowsiness in a cat, but not twitch ings or convulsions The poisonous principle could not be identified

by chemical tests -Asst Surgn Lahmohan Sen, Ind Med. Gaz , 1809, p 118.

Crocs - Nerrum possoning-suicidal -(a) A man, aged 85, after a quarrel with his wife attempted suicide by swallowing rather more than an onnce of every seed oleander time. After swallowing the poison he is stated to have almost immediately fallen down insensible, and when admitted was insensible, with flushed face and stertorous breathing There were violent spismodic contractions of the muscles of the entire body, more developed in the upper than in the lower extremities, and on the left more than the right side "During the intervals of sname the patient Lay evenly on his back, and when action commenced, the superior contractions of the left si le threw him over on his right.' After some hours the spasms decreased the pulse sank to a thread and the extremities became cold Insensibility lasted about 36 hours Underactive treatment, however, the patient ultimately recovered -Dr Broughton Kollinar, 1858 Chevers, M., 256 - (b) A Hindu woman Sundari Rawe, in Calcutta, in 1884 ate some of the bark of Nersum odorum to commit suicide She was attacked by convulsions and became unconscious, but recovered after a time -L A Waddell Beng Ch Fx Repl., 1694, p. 16 -(c) I man in bitapur aged about 50 took some Nerium root mixed with mustard oil to destroy himself on account of a domestic quarrel. He was brought to the bosnital about an hour and a half after the ingestion of the notson in an apparently macraible condition The principal symptoms notice I in the case were vomiting proternaturally slow but regular pulse, and insensibility The man was making favourable progress when, after making certain exertions, he suddenly died probably from heart failure, about twenty four hours after he had taken the poison. He never complained of any pain in the abdomen At the post morten examination small patches of congestion with red points, were discovered near both the pyloric and cardiac ends of the stomach posteriorly, there were also two slight abrasions on the mucous membrane of the stomach. The cavities of the heart particularly the ventricles were filled with black fluid blood Other organs were found healthy -Dr Greig 1840 -(d) A man, aged 35, drank a strained watery decoction of 4 ounces of the root and was attacked soon afterwards with vomiting and cramps. Insensibility came on in two or three hours Eight hours after swallowing the poison he is described as becoming insensible, skin cold and clammy, pulse weak and thready, muscles of the jaws stiff, eyes turned up whites only visible, hunds pretty open but fingers rigid thumbs turned inwards. During the night had frequent convulsive spagms and had not recovered sensibility when taken away from hospital by his friends 18 hours after swallowing the poison and died on the fifth day -Dr Murray, Ind Med Gaz . 1877.

Post mortem appearances .- Patches of congestion in the stomach and upper portion of the small intestine, congestion of the liver, lungs and kidneys, engorgement of the general venous system; both sides of the heart full of blood, but see cases above. Treatment -The general treatment for digitalis and strychnine poisoning Injections of ether and morphine seem to be beneficial.

Identification .- A shrub about six to ten feet high with linear lanceolate leaves and white or pinkish flowers (see Fig. 64, p. 677) The root is 'crooked,' bark thick, soft, external

surface grey corky, on young roots the corky layer is very thin and the interior yellow colour of bark is seen through it, inner surface yellow. The bark when cut or wounded evudes a pale yellow latex which is resinous and very sticky. Odour somewhat acrid like that of a raw potato. Taste acrid and bitter Tests.—The following tests are pre-cribed by Dr. C. L. Bose for the separation and identification of Karabin and Neriodorin in cases of poisoning by this plant.

Separation and identification of the poison in viscera etc— Extract obtained by Strs' process should be treated with water acidulted with a few drops of diluted sulphuric acid and then agitated successively with other and chloroform, the former will take up any Karabin, and the latter Nervodorm, which may be identified (1) by their producing the peculiar acrid pricking sensation on the tongue followed by numbness, (2) by their behaviour with concentrated sulphuric acid and fumes of intricacid, and with concentrated hydrochloric acid and heat, and (3) by the previously described toxic symptoms produced on animals.

BEHAVIOUR WITH CHARCOAL REAGENTS

DEBATIONS WITH CHARCOAD INDAOF 128			
	Neriodorela	\erioloria	Larabin
Cone 11 SO,	Maroon brown passing to vio ict On ex posure to the fumes of H'O, or bromine no change was noticed	the fumes of HNO, or bro mine it imme diately changes	Light brown on exposure to the fumes of HNO, or bromine a faint violet- brown colour develops after some time
Cone H <sub>2</sub> SO <sub>4</sub> +KNO <sub>3</sub>	No change	Reddish violet	No reddish vio let colour
Conc HCl + hert	No change	Dissolves to a yel lowish solution no separation of flocks	Partly becomes soluble form ing a greenish yellow solution with separation of flocks of a dark greenish blue colour
Fehling s solution + hest	No reduction	Reduction	No reduction
Boiled for 3 hours with 2 per cent HCl neutralized with hOH and then heated with Fehling's solution	1	Reduction	No reduction

Fatal dose for an adult human being -Half a grup of Karabin nearly proved fatal to a cat Two grains of Nerredorin killed a cat in 15 minutes One grain of either of these substances may, therefore, be considered to be the fatal dose for an adult cat. From an analogy of the action of other vegetable poisons on cat and man, it will be within the mark if the fatal dose of either of these principles for the latter be fixed at five times that for a eat In the case No 4 about 180 grains of the root produce alarming symptoms but did not prove fatal. As the root con tains about one per cent of Karabin and probably an equal amount of Norrodorin 2:0 grams (about 1 ounce) of the root (which would vield 5 grains of the two active principles) may be taken as the average fatal dose for an adult human being The Veriodorein of Mr Greenish. which is a sanonin only may be neglected as its toxic properties are of a much milder character than those of either Kurahin or Nerrodoria

#### Yellow Oleander

Cerbera Theretia or Theretia nerufelia Volle , or Exile or 'Basturd' Oleander, NO Apo yearen, Pela-Laner (Hind. and Bom ), Kolkiphul or 'vellow fower' and China Karab or 'Chinese



olean jer [1] ng), Pack-char-aları (Tum) (see Fig 65)— This priant, maative of the West Indies but domesticated in India, is angli poisonous. It contains a glucoside therein, a

poison, acting similarly to digitaline It is

chiefly used as a poison for suicide or by women who take it as an abortifacient In Bengal it is especially used in Midurpur and Orissi Of late years the seeds have come into somewhat extensive use in some parts of the Bombay Presidency as a cattle poison

Symptoms —The more prominent of these are a burning sensation in mouth, with tingling of tongue and dryness of the throit, vomiting and purging with drowsiness and dilated pupils, and depression of the heart's action somewhat recembling digitalis, like which its symptoms may be divided into the striges of (1) excitation, (2) depression, and (3) paralysis. In one case a child set three, died with symptoms of totating after eating one seed, and in another case eight to ten of the seeds proved fatal to an adult femal. A timeture of the bark has been used in medicine as an antiperiodic, thirty to sixty drops of a timeture, strength one to five, acts as a purgative and emetic

Case —Yellow oleander poisoning—Suicidal —A Hindu woman in the Contai District of Lower Bengal, in 1884, committed suicide by





Fig 66 —Gerbera thevetin Nuts (Nat Size)

eating the seeds some of which together with the flowering tops, were sent for identification —L A Waddell Ben Chem Ex Rept , 1884, p 16

Gases—Suedal cases—(a) Surp Rowsh, a young Hindu walow, reasident of village Jhowa under the puradiction of Contar Thana rubbed two seeds of yellow olcander with treacle on a mortar and swell lowed them down on the 6th June, 1897, to procure abortion. Minost immediately after taking the poison she felt a burning pain in the throat, counted and purged several times became much prostrated and had several fainting fits. She was brought to hospital by the police on the following day, when her pulse was found to be very soft compressible and slow (52 in a minute), the pupils were normal, and acted on by the stimulus of light, mind clear, skin soft and perspring, she felt gaddiness in the head, felt thirstly and was much troubled with a dragging sensation in the thought. These symptoms gradually disappeared with the exception of slowness of the pulse and guidiness in the head which lasted till the 9th of June, when she gave brith to a healthy male child. The Chemical Examiner detected the presence of the active principle of the poison in the deposit on the stone on which the seeds were rubbed with treacle (Report No 1024B, 11th August, 1897). She was fired by the Sessions Judge of Midapspore, and was sentenced to as in months imprisonment

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(b) Wedennissa Bibi, a Mohammedan female of Jalakhabad, a village close to Contai, took two seeds on the 18th September, 1897, to commit spicide. She was admitted into hospital on the following day, suffering from purgung, vomiting pain in the throat, with severe headache and fainting fits, alternating with drowsiness, pupils pormal and acted on by light, her heart sounds were weak, and her pulse was soft feeble, and compressible (86 in a minute) It remained so for three days, the headache and riddi ness gradually disappeared with the rise in the tone and frequency of the She was tried by the Subdivisional Magistrate of Contai, and sentenced to three days' imprisonment (c) Dainu Bewah, a Hindu widow of village Acri, under the sursdiction of Contas Thana, took two seeds on the 12th February, 1898 after a quarrel with her sister in law. She was aduntted into hospital with pursue, vomiting herdache, and cidliness in the head, her heart sounds were very weak, and pulse was 140 m a minute.



Fig 67 -Cerbera odaliam

soft, irregular compressible, was much troubled with a griping pain about the navel The improvement in the pulse commenced with the abatement of headache and giddiness. She was tried by the Subdivisional Magis trate of Contas and sentenced to one week a imprisonment. (4) On the 21th November, 1898, Kumar Jana fell all with purging, vomiting, giddiness in the head, and fainting fits after taking a meal of stule rice, left in an open pot by his wife, with whom he was not on good terms brought to me for examination by the police on the night of the 27th November, when I found his pulse soft, compressible, and slow (52 in a minute), he looked dull, and walked with a slow and unsteady gait. I

gave my opinion that he was convalescing from Aorobi poisoning, which police, on inquiry, found to be correct. I'rom the above cases it appears that this poison is used by women, not only to commit suicide and procure abortion, but also for homicidal purposes. The poison is a virilent cardiac solidative; it causes death by the failure of the action of the heart. I treated first three of my cases with brandy, and was satisfied with the result. I was affauld to try the hypodermic impetion of strychnine. In case (e) I was obliged to inject other hypodermically.—Asst.-Surgn. Jadub Kits Sen, Ind. Med. Gaz, 1901, p. 412

Case.—Oleander as Cattle-poison.—Oleader was found on a bloody rag from the dung of a bullock suspected to have been poisoned from Saran.—Hemmath Adhikari in Beng Chem Exr.'s Rept., 1919

Identification.—A tree about 12 feet high, with large yellow bell-shaped flowers 3 inches in length, and linear lanceo-late leaves about 5 inches long by \(\frac{1}{2}\) inch wide. All parts of the plant abound in milky juice. The fruits are globular, light-green, about 1\(\frac{1}{2}\) to 2 inches in diameter, and contain a single nut, light-brown in colour, and of a peculiar trangle shape (see Fig. 66), with a deep groove along the edge corresponding to the base of the triangle: each nut contains two pale yellow seeds.

Tests.—The seeds and the inner layer of the bark give, when boiled with hydrochloric aeid, a deep-blue or bluish-green colour. Fragments of the seeds may be recognized as follows.—Exhaust with alcolol, filter, and evaporate the functure to dryness. The residue may then be washed with ether, and the washed residue tested as follows (1) A portion waimed with hydrochloric acid gives a deep bluish-green colour, destroyed by permanganato of potash solution (2) A portion treated with strong sulphuric acid gives a brown colour, changing slowly into a rich crimson, which, on exposure, becomes deep-green at the edges

This crimson colour, Dr E A. Hankin finds, develops best in the presence of traces of alcohol. The vomit of a person poisoned with Cerbera gives a blue colour when boiled with hydrochloric acid. Another specimen of the vomit should, in this case, be evaporated to dryness. On adding concentrated sulphuric acid no crimson colour appears. The acid should be poured off, and a few drops of alcohol poured over the residue. The crimson colour then appears, If a dry seed of Cerbera is crushed and placed in concentrated sulphuric acid, a strong crimson colour will develop on the addition of a few drops of alcohol.

Dr. C. L. Bose notes that besides the deep bluish green colour which the fresh bark or seed gives with warm hydrochloric acid (a test discovered by the late Dr. C. J. H. Warden), the seeds yield to the ethereal extract by Stas' process a white crystalline deposit (not an alkaloid, but more probably a glucoside) which, when applied to the tongue produces a burning sensation accompanied by tingling which often extends to the lips There is also dryness of the throat This sensation generally lasts from half an hour to one hour, though the tip of the tongue may remain benumbed with a rawish iceling for a longer time. This sensation is not likely to be mistaken for that produced by Acontine on the tongue, which lasts for more than six hours, and is of a less burning and more tingling character

Cerbera odallam (see Fig 67) -This plant closely allied botanically to the last probably contains the same poisonous principle. Like the plant last described it also abounds in milky juice and this and the seeds when heatel with hydrochlone acid give a deep blue or bluish green colour similar to that given by Cerbera il eveli: The flowers are jazznine shaped white about 1 inch in length the leaves are dark green fleshy and lanceolate about 4 to 5 inches long by 2 inches in greatest brealth Fruits nearly globular dark green and contain in a cavity in the centre a single oval white seed

#### Aconite

Acouste is one of the most virulent poisons known All the aconites (NO Panunculacear) are poisonous and some so extremely so that the general Indian vernacular name for them is Bish or Bikh meaning the poison. The most poisonous species are A feroz and A napellus which Hooker was inclined to think were merely varieties of the same species. All parts of these plants are poisonous

A. ferox (see Fig. 68) is a native of the Himalayas and its root forms most of the scoute root of the Indian hazaars It is believed to be even more actively poisonous than A napellus to which it is generally similar

in appearance

I napellus or monks hood wolfs bane or bine rocket is a common rlant in l'agland and grows also in the Himalayas Its root and leaves are officinal. It is perennial two to three feet in height with dark green digitate leaves and an erect terminal spike of blue helmet shaped (hence called monk s hood ) flowers. Other extremely poison our species are 1 liridume from Sikhim and A licoctonum from Kashmir to humaon Less poisonous species of acouste are -A pal matum in the eastern temperate Himalayas from Garhwal to Mishmi Hills in Assam and A leteropl yllum in the North western Humalavas The root of the former is known in the vernacular as Bill ma Bill ma (Hands) Wall was at Vallena (Rombay) and of the latter as it a (Hindi) Atirisha (Maratha) Atii i la jam (Tamil) Ata akha in kali (Gujerati) The roots of these are smaller than those of the stronger species. They are used in native medicine as tonics and antiperiodics Their alkaloids differ from sconitis.

The root, cold in the Indian bacaars is mostly derived

from A ferox, and is known under the names of Bish, Bilh, or Pachnag (or snake-bite preserver) Mitha bish (sweet poison), or Mitha tetiya (Hindh), Bach nab (Bo), Vashnarı (Tainil) It is met with in two forms —(1) Conical roots, see Fig 69, three to flour inches long, and half to one and three quarters inches in

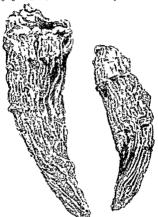


1 10 58 --- Aconitum ferox x 2

greatest drumeter, shravelled with longitudinal wrinkles, and often flattened and arched Externally they are blackish brown, internally, from being dried over a fire they are generally hard, horny, and brittle and on section darkening slightly on exposure to the air (2) The same roots, after subjection to some scaking process, generally stated to be soaking in oil (hence called \(\textit{elg/id}\)) and cows' urine These are black, plump conical tubers cylindrical in section, tough and moist and stanning the fingers

brown when fresh When dry, they are hard and brittle, and have a reddish-brown resmous fracture. They have a strong offensive odour.

Atts tubers are smaller, and Bikhma tubers about the same size as those of A froz, but branched. Both are externally much lighter in colour than the tubers of A froz. Both taste simply bitter, without the tingling and numbres. The root of A napellus is currot shaped,



Pig 69 - Iconite Boot (deconitum feror), natural size

two to four mehes long, by helf an much to an meh thick at the top, dark drown externally, and whitish within The fresh root has numerous long bin curing rootlets attached to it. The dry root as shrivelled longitudually and breaks with a best fracture. Chewed, it causes inguing and a pubness of the lips, etc. It may be distinguished from horse radially, and he spindered, longer than account root, and extraully of a . I buff colour. Rootlets attached to it are straight chewed, it has a Thet state, but does not cause impling and numbress like accounts.

ACONITE 689

root A  $\it ferox$  is extensively collected for commerce from Sandukphu  $^{\rm t}$  a mountum near Darpling

The chief active principle of A napellus is acontine, while A ferox owes its activity mainly to pseudo acontine which, although differing somewhat in composition and clienteal properties, has the same physiological action as acontine Other less active alkaloids some of which are not poisonous, are contained in both species, two of which, aconine and pseudo-aconine, are obtained by the action of heat from acontine and pseudo-acontine respectively

Acontine is one of the most active poisons known, if not the most active It crystallizes with difficulty, so is usually met with is a white amorphous powder. The various kinds of commercial accountine diffic considerably in activity owing to more or less admixture with the other relatively inert alkaloids in the root of their derivatives. English aconitine (Morson's) is more active than the Germin and is not bitter but slightly soluble in writer but not very freely soluble in alcohol and ether, while the German alkaloid is soluble in all three and bitter; this is owing to its containing a considerable proportion of the less active alkaloids namely aconic which is 2000 times less active than aconitine and ben-aconin which is 200 times less toxic.

The activity of Morson secontine seems similar to that of the I rench Dr Harley found that \$\_t \phi\_h of a grain of Vorson a scontine nearly killed a cat weighing 3 lbs whilst two other cats weighing 3 lbs each died in 71 hours and \$\_t\$ of an hour respectively from a suboataneous does of \$\_t b\_0 grain which is equivalent to 0.002 mgm per killo of boly weight for cats. But man is much more sensitive as 16 mgmin of French (1 cities) accountine nearly proved fatal whilst 4 mgmis by the mouth was rapidly fatal and it is probable that 15 mgm in impected subcutaneously woult prove fatal. The medicinal does of the BP timeture 5 to 15 minims equals approximately 0.00 to 0.015 grain of secontine and 2 mgm of accountine = 0.030 grain of the alkaloid or about 30 minims of the BP timeture.

Poisoning by the root.—In India the root is extensively used by the wilder tribes of the Himalayas from Assam to Kasimir to poison arrows for the class is well as for intertribal conflicts. In our military expeditions on the North Fastern Frontier in Sikhim Bhutan and Assam several of the Sepoys have been mortally wounded by these poisoned arrows.

<sup>&</sup>lt;sup>1</sup> Among the Himalaysis by L A Waddell pp 3°1 325 The name of this mountain, San-dur plu means as Colonel Waddell first pointed out the hill of the acounter plant

<sup>&</sup>lt;sup>2</sup> See Blyth s Poisons 352 and Allen s Commercial Analysis 11 Pt II for details <sup>3</sup> J T Cush in Beng Med Jour October 8 1898

Blyth I orsons 257

So real of these possessed arrows used accurate our troops in the Aleserpedition of 1884 were sent to Dr J A. Waddell for examination and analysis and the arrows were found to be smeared over with a paste con taning accurate (see figs p 119). The arrowheads were made of hamboo ingeniously continued to carry the posson into the wound, and retain it there. For this purpose the surface of the arrowhead was balled obliquely to form little pockets or valves whilst others were constructed of divertained precess their logical properties of the suppose the compact of the suppose of the suppos

The Lepchas of Sikhim have a saying that aconite is useful 'to hinters for destroying tigers and elephants useful to the rich for putting troublesome relatives out of the way and useful to jealous husbands for destroying faithless wives. The Lepchas poisoned with aconite root the water supply of a detachment of British troops during the expedition of 1887. Similarly the Burnese during their retreat before the British in 1842 threw bruised aconite root into a tank in the hope of poisoning the troops pursuing them? and the Gorkhas did the same in the wells in the Sarui tarai aguinst General Ochterlony's troops in the torkha War of 1814-16

Accidental poisoning by acomite is occasionally met with as a result of its common occurrence in bazaars and its use as the drug by native quacks in the treatment of feer etc (see Cases pp 693-94), also from native alcoholic liquor to which it is added occasionally (like datura) for the purpose of conferring additional intoxicating power sometimes with fatal occults Hommerdal cases are not unfrequently reported (see Cises pp 691-92) but are not so frequent as one might expect considering how readily the drug can be obtained and how well known are its poisonous properties. It is sometimes administrated to the victim with betel pepper so as to disguire its timeline taste.

In 1898 in Madras acousts accounted for the largest number of deaths from consoning with any organic po son 14 persons having died out of 22 affec ed in 7 cases (Ms i Ce em Le Rept., 1898), and Burton Brown records only numeters cases in the Yanjab in the years 1803 7a. In work of the control of the contr

<sup>2</sup> See Beng Clem Rept 1985 Wallich quoted by Chevers Wed Jur., p 196

Wallon quotes by Losers and Jan. p. 1500

It may be mentioned here that a non poisonous hatk namely that of
Acacia Lucophlow Heaver (Mar.) is used in the South Concan in distilling
liquor. It contains much tannin and pecif takes albuminous matter, present
in the junces from which the I quor is distilled. hence its employment

L A Waddell Beng Chem Ex Pept 1881 p 18 and Dr Hammath

In Europe acomie is rarely used for criminal purposes. According to Bilyth in the ten years ending 1859-28, eighty soven cases of acontit poisoning were recorded in Luropean medical Hierature of which two were homicall, seven succilal and seventy seven accidental It should be noted that in Europe accidental cases sometimes arise from acontiroot being eatin in mistake for horse radiosinchimas arise from acontiroot being eatin in mistake for horse radiosinchimas.

Action and Symptoms -- Acoustine or acouste root itself first stimulates the sensory nerves producing tingling and then paralyses the sensory nerve terminals, causing numbness It produces similar effects on the motor perves and centres of the medulla and cord, while the higher cerebral centres are little affected. The motor ganglia of the heart are paralyzed, the respiratory centre is slowed death being usually due to arrest of respiration The temperature sinks from the outset Symptoms -Aconite causes tingling followed by numbress, first of the parts with which the poison has been in contact, en the lips and tongue, and subsequently in all parts of the body This tingling, followed by numbness is a characteristic symptom of acomite poisoning Irritation of the stomach is also caused, hence vomiting sometimes violent is generally a constant feature There may be diarrhora. From its paralyzing action on the motor nerves (or centres) and on the heart, other symptoms of acouste poisoning are -great muscular weakthe patient staggers if he attempts to walk respiration becomes slow and weak, and the pulse slow, weak, and irregular Death may occur from shock or syncope but usually occurs from asphy via due to paralysis of the respira tion Convulsions may precede death. The pupil in the early stages of the case alternately contracts and dilates, but becomes widely dilated in the later stage. The mind is usually quite anaffected, but in exceptional cases delirium has been observed The case below well illustrates the symptoms of aconite poisonin\_

Case — Typical acouste possoning — Homiodal — In 1902 Monorath a shopkeper in the Tera was charged at Almora with mustering a fellow villager by poson. The evidence showed that the accused gave refreshment of the to leave at of the villagers, including the deceased, with which latter person the accused was at enmity. After helping all the others, accused saked deceased to bring some water from the river, and prepared, during deceased a bisence another cup of the tea which he gave to deceased who immediately remarked that it caused a tingling and pricking of his lips and mouth and a burning of threat with nause and a 'twisting pain in the stomach whereupon he tared the accused with having poisoned him. The tingling of the lips and mouth were soon followed by numbriess and a free flow of salive and comiting occurred Within less than half an hour the tingling and numbness extended to his arms legs and whole body, which had darting pains as if being 'torn he had dinness of vision guldiness staggering and was unable to walk without assistance. He then lost power over his legs and remained lying prostrate,

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complaining of intense faintness. His pulse became feeble, respirations terky and laboured, and lumbs even cold and most to the touch grew gradually weaker and drows; and died within two hours of taking the porson. The next mortem examination showed that the stomach lining was bright red and contained some lale, the small intestines contained a large amount of solid faces, which negatived cholers, which with its cramps in the limbs had been put forward by the defence as the cause of death, the brain and venous system generally were darkly congested. In the contents of the stomach an alkaloid was found possessing the properties of aconitine -L. A Waddell, Civil Surgeon, Almora, 1902

Cases - Homicidal acouste poisoning by liquor drugged with acouste --(a) In 1834, about 70 men, 18 of whom died, were poisoned at Benares by drinking Mows liquor obtained at a particular liquor shop. One of the servants at the liquor shop afterwards confessed to having put sconite root into the houor -Chevers, Med Jur p 138 (b) In a case from Morei (Hyderabad Assigned Districts) a small bundle taken out of the receiver of a country liquor still was on examination found to contain a quantity of fragments of acouste root. Of cleven persons who had drunk honor bought at the shop of the owner of the still ten, it was stated suffered from slight symptoms of acomite poisoning the eleventh, who had drunk about a quart of the hquor, died.—Bo Chem Analyser's Rept. 1884. (c) In pachway - beveral persons drunk pachway in a ligour shop in the district of Birbham Soon after they all suffered from severe burning sensation in the stomach tipgling and numbress of the extremities and vomiting Six of these persons died and congestion of the stomach and other internal organs was found in most of the cases on post morten examination. The viscera of the six persons were sent for chemical analysis, and acouste was detected in three of them. The vomited matter of some of the deceased and a sample of the packerse which they took were also forwarded for analysis and acouste was detected in them. - C L Bose, Benj Chem Lx Pert 1907

Cases Homicidal acousts possoning by food -(a) In 1899 a Moham medan Adibuddi, of Patuakhah in Bengal, was given some poison mixed with food by his wife Moina Bibi. He comite I and purged soon after, but ultimately recovered. Acouste was detected in the younted matter The wife confessed to the police that she had mixed some powder with the food of her husband in order to poison him. A portion of this powder was also sent for examination and it was found to contain acomite L. A Waddell, Beng Chem Lz Rept , 1899—(b) (Beng Medico legal Rept p 277) In a case reported from Gujranwala by Mr R C Bose a woman confessed to having killed her son in law, at 50 by administer ing to him half a tola (90 grains) of acomite root | She said that about half an hour after the imbibition of the poisons the man began to complain of pain in the stomach numbuess tickling sensation in the throat, and subsequently of severe tomiting followed by coldness of the extremities, collapse and rigidity of the han is and fingers Death took place in seven hours. -(c) In Dinapur in Northern Bengal, in 1884 a young Moham medan, aged 19, was reported to have died by purging and vomiting after taking milk given to him by his step mother who was suspected of deliber ately possoning him. Acouste was detected in the stomach, liver, and comited matter -I. A. Waddell Beng Chem Ez I ept , 1884, p 12.—
(1) A Gorkha Sepoy, at Dibrugarh in Assam, in 1881 had poison placed in his food by his wife between 7 Px and 8 Px On admission to hospital immediately after he complained of tingling and numbness of lips and tongue, and pain in tomach. Latterly giddiness supersened, the tingling

and he somited Skin became cold and moist, pulse small and thready, difficulty in breathing set in and he died at 8 30 PM He was sensible up to time of death. The post mortem examination held sixteen hours after death showed pupils widely dilated, brain much congested and its substance studded with minute points of ecchymosis, lungs much concested, heart normal, stomach distended somewhat with food, mucous lining injected, small intestine congested. Acouste was found in the stomach contents -L A. Waddell. Beng Chem Lx Rept , 1884, p 13 -(e) The assistant surgeon of Mada ripur referred a case of acouste poisoning with the following history A Mohammedan was given some food cooked by his wife Soon after he felt very bad, vomited, and was purged, and died in about two or three hours The post morten examination revealed congestion of the mucous membrane of the stomach, which still contained much undigested food The small intestine also presented a red appearance. The lungs and the liver were intensely congested, the brain the spleen and kidneys were also congested. The viscers and the vomited matter of the deceased were forwarded for examination, and acouste was detected in them -C L. Bose, Beng Chem I'x R pt 1906

Cases - Accidental acouste poisoning -(a) (Bo Chem Analyser's Rept., 1875-76) In a case from Coompta a noman after taking medicine given to her by a quack for menorrhagia sufficied from "rest lessness, depressed and irregular heart's action coldness of the surface, numbness and tingling of the lips, tongue, and extremities spasm of the diaphragm, and difficult respiration The woman recovered under treatment, acouste was detected in the somited matter -(b) (1b 1877-78) A man was admitted into the Jamsetjee Jeejeebhoy Hospital Bombay, suffering from symptoms of acomite por-oning On inquiry it turned out that he had been taking pills supplied to him by a native hakim of these pills, on examination, were found to contain cinnabar and aconite -(c) (ib 1879-80) At Mahad, in the Colaba district a man the servant of a native hakim, swallowed some of the preparation of acomite root he was making for his master, death resulted, and on analysis acomitia was found in deceased's viscera -(d) A Tibetan a Buddhist priest at Jalpaiguri in 1884 bought several articles of food which he cooked and partook of with his friend at 9 a m and within an hour was attacked with a burning pain in the stomach and raging thirst and died at 4 PM the same day His friend, who had eaten less was seized with similar though less severe symptoms. He complained of tingling in the mouth and throat, numbness in limbs, dimness of vision and giddiness, and after a time became unconscious In the afternoon he recovered consciousness, and on admission to hospital had dilated pupils, incessant thirst and vomiting, pulse weak and irregular. He ultimately recovered fatal case the post morten examination showed -Pupils dilated internal organs generally congested, stomach highly congested and coated with bile. The stomach and its contents with portion of the liver were sent for analysis, and acouste was found in them -L A Waddell, Beng Chem Ex Rept , 1884, p 11

Fatal period.—Shortest recorded, twenty minutes, longest, twenty hours; usual, within three or four hours. Fatal dose—Of the root, one drachm (presumably of the root of A napellus) has caused death. Chevers, however, mentions a case in

<sup>1</sup> Med Jur , p 143

which fifteen grains of Indian acouste root gave rise to severe symptoms, and had symptoms have been produced by inhaling the dust arising whilst powdering the root? The tincture of acouste BP and IP is prepared from the root of A napellus strength two and a half ounces to one pint. The medicinal dose of it is five to fifteen minims. Taylor mentions two cases in which one drachin of the fincture caused death, and a case is reported in which fifteen minims of the tincture caused severe symptoms In these three cases the tincture was probably that of the old London Pharmacopera, which was three times as strong as that of the BP Another tincture of acouste. known as Fleming's Tincture, is three or four times as strong as the BP tincture 3 A case is reported in which death is believed to have occurred from the too frequent external application of Neuraline, a preparation containing Fleming's Tincture. Another officinal preparation of the root is the limiment-strength I I' one to one, BP two to three Lastly, the BP and IP both contain an alcoholic extract of the leaves (of A napellus) medicinal dose one-sixth of a grain gradually increased Two grains of the extract has caused death. One-fiftight to one-fortieth of a grain of acontine has caused alarming symptoms Probably one twentieth to onesixteenth of a grun given by the mouth would usually cause death in an adult Blyth considers that the minimum fatal dose when given by the mouth is even less than this, and that probably about one fortieth of a grain subcutaneously injected would cause death The only officinal preparation of acoustino is an ointment, strength eight grains to the ounce

Case - Homicidal acousts possoning - Multiple. On 6th May, 1891. three coolies of the chamar caste were found lying dead in the Dharamtola market, two others were unconscious but subsequently recovered. The investigation showed that all five men had been poisoned with acouste mixed in their food by one Jitu Chamar at the instigation of Sanu Chamar All concerned were fellow-countrymen and had been friends up to the time of the act the cause for which apparently consisted in the fact that one of the murdered men had a quarrel with Titu Chamar who thereupon introduced poison into the common meal of five individuals inth four of whom he was not in any way at variance \o example could be more striking of the recklessness of the poisoner on the one hand, or on the other of the small provocation required in some instances to in luce the net .- C L Bose, I rec Med Cong . 1894

Case - Homicidal acouste possoning - Lainson Case - George Lainson, aged 29, a surgeon, was committed in London in 1882 for the murder of his brother in law Percy John, aged 19, a cripple, who had property which would on his death, revert to Lamson s wife, John's sister On November 24th, 1880, Lamson purchased two arous of acoustine, and on

Woodman and Tidy, For Med. p 391 Bitth, Postons p 334. \* Possons p 756

December 3rd went to the school where the lad was, and during an interriew gave him a capsule which he filled at the time with a white powder alleged to be sugar. Lamson then left and within 16 minutes John became ill, volent vorniting set in with pain in stomach, construction of throat, and he died within three hours and three quarters after swalfowing the capsule. The viscera, vomit etc., were analyzed by Dr. Stevenson, of Guy s Hospital, who found aconite present in the viscera, contents of stomach and urine, and he considered that the vomit contained a quarter of a grain of aconitime. Sentences of death was passed. An attempt was afterwards made to get him off on the ground of insantly it was urged that he had long been very eccentric, was in the habit of using enormous doses of morphia and opium as hypodermic injections, and had for a long time had a morbid habit of prescribing dangerously large doses of aconite for almost every disease. The Home Secretary refused to interfere, and he was executed.

Case —Aconste as Cattle poison —In a case of suspected poisoning of a horse in Singhhum, Aconste was found in the viscera—Heumeth Adhikan, Beng Chem Exrs Rept, 1919

Treatment.—L'aconate contents of the stomach, administer animal charcoal and stimulants. Keep the patient in a recumbent posture, apply friction to the surface and keep up artificial respiration. Blyth recommends hypodermic injection of atropine (4 drops of B P solution), repeated from time to time, and if tendency to syncope, tincture of digitalis in half-drachm doses by the mouth or ten-drop doses subcutaneously—see following case

Post mortem signs—General venous congestion, congestion of the brain and its membranes and frequently, if the poison has been taken by the mouth, some signs of gastro intestinal irritation

DEFECTION—Aconitine (or pseudo-aconitia) may be extracted from organic mixtures by Stas process p 545, conducting the ovaporation at as low a temperature as possible, and using a mixture of chloroform and ether as a solvent. There are no reliable special colour tests for these alkaloids They may, however, be identified by physiological tests, namely, by the tingling and numbing sensation produced by a cautious application of a solution of the alkaloid to the tongue or lip, and by the effects produced by administration of the alkaloid to smaller animals

The Goat for physiological Aconite tests —As the physiological test is the chief one for aconite, and aconitine is one of the most deadly poisons known, it is undesirable that the chemical analysis should run un necessary personal risks in detecting the poison for State prosecutions. The goat has been found by Major Black Punjab Chemical Examiner (1916), to be very successful Hewrites 'The Civil Surgeon, Guranwala, forwarded certain articles in connection with a case in which it appeared that a woman had attempted to poison two other women. No history of the case nor statement of symptoms was even but defur was mideated

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as the poison probably used. Among the articles forwarded was a brownish, black powder which was apparently of a vegetable nature, but could not be identified under the microscope, also a capsule or pod of datura, these articles having presumably been found in the possession of the accused. As a preluminary test a small quantity of an ethercal extract of the brown powder was introduced into the eye of a kid, in order to observe whether the dilatation of the pupil characteristic of datura resulted The symptoms noted were In 20 minutes great muscular meakness, staggering gast the animal appearing to lose control of all its limbs, and occasionally falling down the forelegs in particular seem to give way at the kness even when the animal stants still. Breathing have was a regular to dilutation of the pupil. The symptoms passed off in the whours and next morning the kid was quite well droute and at once, suspected from the above symptoms, and the case obsequently proved to 1, one of combined aconte and arrante poisoning. The only reason for supra-8 ing deluter appears to have been the presence. The only reason for suspec. a above The medico legal interest in the of the datura capsule notiff uptoms that followed the introduction of case lies in the market case hes in the marked syme, inc the active principle of acouste, into a very small quantity of acomina, that this might be utilized as a torico the goat s eye, and the possibilit to logical test for acouste

logical tast for acounts to II has sheen a smallar action to II has sheen afrealy mentioned nather than the same of the has a similar action to account an the same of party of the same o dispines in asthma etc., and containing several alkaloids among the ground aspidospermine and quebrachine has a paralyzing action on volunt at movement and respiration, and appears therefore to be a spinal pois Tobacco and lobelia also are spinal as well as cardiac poisons

fal,d The importance of sending, in every case of suspectivete poisoning the vomited matter as well as the viscera from fat tim

cases is illustrated in the following cases -

In view of the minute quantity of the poison usually used to produce a fatal result and in view of its liability to decompose, it is probable that it has never been detected after absorption into the tissues It may be found in the contents of the stomach before absorption, and also, more frequently, may be detected in the vomit. In a case that occurred in the United Provinces it was detected in a stain on the pyrama of a woman, but it could not be found either in the vomit or in the viscera The vomit in this case had been mixed with wood ashes Such ashes contain a quantity of alkalı. Alkalı is known to decompose aconite Ashes are frequently used in clearing up a mess of vomit if vomiting has occurred inside a house By a series of experiments Dr Hankin discovered that wood ashes have the power of slowly destroying acouste and that this power was due to the presence of alkali. The addition of alcohol to a mixture of ashes and aconite was found to check the decomposition. The decomposition was found to be still further checked if acetic acid was added besides alcohol, though the quantity of acid used was not sufficient to neutralize the whole of the alkalı present

The Colchicums which exert an asthenic action on the heart have already been described amongst the irritant vegetable poisons, see p 550

# Hydrocyanic or Prussic Acid.

Poisoning by hydrocyanic acid, common in Ingland, was some years ago almost unknown in India. Of late years, however, a few suicidal cases have been reported by the acid and by cyanide of potassium, see Case, p. 701

Pure undulated hydroxyanic scid rapidly decomposes, an I is not not with in commerce. Dilute hydroxyanic acid, the form in which the acid is used as a poison is officinal in the Pharmacopens. The dilute acid of the British and Indian Pharmacopensa contains 2 per cent of anhydroxyanic acid, that of vanious foreign I harmacopensa ranges from this strength to 10 per cent (Paris Pharmacopensa) or even more. An acid met with in commerce called Scheele's said contains 5 per cent.

Certain portions of many plunts contain hydrocyanic acid, or yield it under appropriate treatment, owing to the decomposition of amygdalin, or substances allied to amygdalin (see 'Izsential oil of bitter almonds') Hydrocyanic acid swallowed, inhaled in the form of vapour, or otherwise introduced into the system, paralyzes both the brain and the spinal cord, causing insensibility and loss of muscular power. Death from large doses occurs rapidly by syncope, due to arrest of the heart's action, or from smaller doses less rapidly by asphyxia, due to paralysis of respiration.

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Symptoms.—These vary to a certain extent with the dose Small poisonous doses cause a hot bitter taste giddiness pains in the head and conjusion of intellect, followed by invensifulity and loss of muscular power The eyes are bright and pro minent the face pale and salivation is frequently present The breathing often becomes stertorous, the breath smells of hydrocyanic acid and in a very short time (see Fatal period') death takes place by asphyxia Lock jaw and tetanic con vulsions and involuntary expulsion of urine and frees often precede death Vomiting has been observed but is not a common symptom Large poisonous doses cause almost imme dinte insensibility and rapid death from syncope. In rapidly fatal cases convulsions are not usually present but there may be involuntary expulsion of urine and faces. In cases of this class death usually takes place with a forcible expiration, which may or may not be accompanied by a shrick Some of the more important medico-legal questions which may arise in cases of poisoning by hydrocyanic acid are as follows -

 Interval between swallowing the posson and insensibility —Large doses given to animals cause almost immediate insensibility. In man the action of the poison appears to be less rapid insensibility may however come on in a few seconds and is rarely if a full dose has been taken delayed beyond the second minute. Still however even when a full dose has been swallowed considerable power of volution and locomotion may remain and various acts may be performed in the short interval between swallowing the poison and supervention of insensibility. Hence finding the bottle out of which the poison has been taken corked or even placed on a shelf or table close to but out of reach of the body as con sistent with a supposition of suicile 2. As to the shrick -This is not nearly so frequent a symptom of hydrocyanic aci I poisoning in man as it is in the lower animals. What may be called the true hydrocyanic acid shriek accompanies the last forcible expiration after such a shrick nower of speech etc no longer remains 3 Presence of hydrocyanic acid in various articles of food.—An igidin yielding hydrocyanic acid by its decomposit on is contained in the seeds leaves and flowers and some times the bark of most species of the sub-orders 4mjg lale and Pomee of the \ O Rosacce Its presence in the following may be specially noted in bitter (but not in sweet) almonds in apple and pear pips in plum damson cherry peach aprient and quince kernels and also (appa rently) in h quat seeds. The presence of hydrodyanic soid ready formed in the root of the jatropha manihot has already I con mentioned (p. 559) It is est mated that 210 grains of bitter almoud pulp 333 grains of cherry kernels and from about 1200 to 2900 grains of apple pips are required to yiell a quantity of hydrocyanic acid equal to 30 minims of the B P dilute acid ! Kirschwasser, a brandy distilled from wild of ernes contains I viro evanic acid to the extent it is said of I to 4 grains in a pint. Hydro cyame acil is also contained in chlorodyne (see p. 619)

Fatal period and dose.-Large doses have been found to

Peach kernels contain rather less amygdalin than cherry kernels plam kernels contain rather more amygdalin than apple pips

kill the lower animals almost instantaneously. In man death occurs less rapidly, but has occurred as early as the second minute, and as late as one and a half hours after swallowing the poison When the dose is 11 drachms or more of the B P. acid, the average fatal period is two to ten minutes smallest dose which has proved fatal to an adult is 0 9 grain of anhydrous acid, death occurring in twenty minutes , recovery has, however, taken place from 24 grains. One grain of the anhydrous acid may, but will not necessarily, prove fatal In estimating the amount taken, it is important to recollect that drops and minims are not necessarily the same Woodman and Tidy state that ten drops of hydrocyanic acid equal on an average 20 minims 1 It may be further noted that dilution seems to make no difference to the action of the poison, but exhaustion from any cause such as fatigue, favours its action, also that, although it has been asserted that hydrocyame acid may act as a cumulative poison, the weight of evidence is greatly against its so acting Treatment -The best antidote is a mixture of a ferrous and ferric salt, with a little caustic soda or potash, or, if caustic alkali is not obtainable, with carbonate of soda Inhalation of chlorine, e q from a mixture of chloride of lime and dilute acid held near the nostrils is also The other indications are to promote somiting to endeavour to restore sensibility by cold affusion and inhalation of weak ammonia, and to employ artificial respiration

Post mortem signs.—These may be nil but are generally similar to those of death from asphyxin The edour of hydrocyanic acid is often, but not always, perceptible in the body, the bruin and muscles, as well as in the stomach. The smell of hydrocyanic acid has been detected in the stomach seven or eight days after death

Tests.—Distil the viseers in a stream of carbolic acid gas Heat gently, as the prusice acid is very volatile. Interrupt the distillation as soon as about 20 cc have come over. The receiver in which the distillate collects should be surrounded by ice.

The distillate should be tested for prussic acid as follows -

(I) Make "Schornbein's test paper" in the following way drind up a few grains of guivoum resin in a mortar Add 10 cc of absolute alcohol and continue grinding until the guiacum is dissolved Small strips of filter paper are then to wetted with this solution Allow them to dry Wet a

According to the same authorities ten drops of chloroform or of fineture of opium equal five to six minims, and ten drops of the following functures equal six to eight minims—accordite digitals and byosogamus

pucce of this paper with 1 in 1000 copper sulphate solution. If it is then hild over a liquid containing prission and or a cyamide the paper will turn blue. If the paper remains colour less a certain proof has been obtained that prussio and is about. If the paper turns blue there is only a presumption that prussic and is present. The paper is only sensitive when freshly prepared. It slowly turns blue if kept for a few duys

(2) Berlin blue reaction —Add to a portion of the distillate a small quantity of pure caustic soda or potash Add a drop of ferrous sulphate solution and a drop of a solution of ferroe chloride. Warm gently just to the builting point Do not filter Cautously audity with hydrochloric and In the presence of prassic acid or a cyanide a line precipitate of Berlin blue as formed II only trues of cyanides are present.

the solution turns green and I lue floculs slowly deposit

(3) The Mitro prasside test. To a portion of the distillate
add a few drops of Johassium intrate solution and two to four
drops of ferric chloride solution. A brownish yellow colour is
thereby produced. Add sufficient sulphuric acid to change, this
colour to pale yellow. Heat all the mixture begins to boil
Allow to cool. Add a few drops of ammonia. Tilter and add
to filtrate a drop or two of a very dilute and colourless solution
of ammonium sulphide. If a cyanide is present a violet colour
is produced. In a few minutes this changes successively to
blue green and yellow. If fonly very small quantities of cy mide
are present the colour is at first bluish green—soon passing to
greenish yellow. If truces of alcohol are present as will be if to
case, if the viscera I avo been preserved in alcohol the colour at
first produced will be yellow instead of violet (Hankin).

If analysis does not detect it death may nevertheless have been due to poisoning by hydrocyanic and A case is recorded of death from hydrocyanic poisoning in which analysis twenty six hours after death failed to detect the poison. On the other hind it has been detected by analysis seventeen twenty-one and even twenty three days after death and may be detected even if no odour of the acid is perceptible. Although analysis detects it it may possibly be objected that the poison found (a) last leen jielded by apple pils cherry kernels or the like, hence the contents of the stomach comited matter etc. should always be carefully scarched for such bodies which if found should be sperivach before protection, with the similysis.

(b) Has been yielded by the decomposition of simpliogram le of potassium present in the saliva, this theory may account for the discovery of a minute truce of hydrocyanic and but not for more.

(c) Has been produced by the action on organic matters of

the heat employed in distillation A high temperature, much higher than that of a salt water buth, would be required, however, to produce even traces in this way

Case — Hydrocyanic acid poisoning—Suedal — A Bengali Hindia, aged about 36, was found restless in his bed for a few minutes, and then expired Two empty phials which had contained hydrocyanic acid were found near the deceived. At the post mortem examination the stomach was found dilated and empty, the mucous membrane was deeply congested, and correct with thick, samous looking tenacious micros. No smell of hydrocyanic acid was detected in the stomach. The viscera were sent for elemical analysis by the Givil Surgeon of the 21 Farganas, and hydrocyanic acid was detected in them—C I. Bose, Beng Chem Lx Rept.,

Case—Hydrocyanic acid—Theft and Murder—A case of murder by administration of hydrocyanic acid attended with robbery, occurred in the town of Calcutta in October 1906. A woman of the town was seen crimking with a stranger in her room one evening, shortly afterwards she was discovered by the other immates of the house lying on the floor, but the stranger was not to be found anywhere. She was placed in her bed and expired soon after. The post mortem signs were consistent with death from heart failure. The chemical analysis of the viscera revealed the presence of hydrocyanic acid. The ornaments of the woman were missing. The murderer still remains undetected—C. L. Bose. Beng. Chem. Ex. Rept., 1907.

Essential oil of bitter almonds, Benzoyl hydride, or Benzoic aldehude, is obtained by distillation of an emulsion of the cake left after expression of the fixed oil from bitter almonds formed by the fermentative action of emulsion, present both in sweet and bitter almonds on amygdalin, a glucoside present in the bitter, but not in the sweet variety During the decoinposition, hydrocyanic acid is also produced, which, if not removed, renders the oil poisonous Essential oil of bitter almonds unpurified, as generally sold, contains 8 to 15 per cent of hydrocyanic acid. Seventeen drops of the unpurified oil has caused death in an adult and probably less would prove fatal Fssential oil of bitter almonds is also sold under the name of peach-nut oil, and a fatal case is reported, arising from its having been sold by mistake for beechnut oil Diluted with four to eight parts of rectified spirit, it forms the almond flavour or essence of the shops, sold for the purpose of flavouring confectionery Bitter almond water, another preparation, contains hydrocyanic acid to the extent of 0 25 to 1 0 per cent A fital case of poisoning by bitter almonds in an adult female is also reported The quantity taken was estimated at about 1200 grains The symptoms, treatment, etc., in poisoning by essential oil of bitter almonds are the same as in poisoning by hydrocyanic acid Hydrocyanic acid may be detected in it by the vapour tests, or by applying the tests for the acid to water

which has been shaken with the oil. The purified oil—from experiments on animals—acts as an intorceant, but is very much less posonous thur the crude oil. Water distilled from the following also contain hydrocyania acid derived from decomposition of amy gladin or a substance allied to it the leaves of the cherry laure! (Primus laurocerusus) the flowers bark, seeds and leaves of the mountain ash (Sorbus aucupearia), and the birk, seeds and leaves of the cluster cherry (Primus padus). One ounce of cherry laure! water has proved fatal to an adult, and in a celebrated case (murder of Sir T Broughton, 1781) two ounces proved fital in half an hour. The blossoms of the peach also have, from a similar case, in two cases caused death

Cyanides of potassium, Sodium and Ammonium are alt intensely poisonous Cyanide of potassium, more commonly met with than the others, contains evanogen equal to about 10 per cent of hydrocyanic acid. It is largely used for various purposes in the arts eq in cleaning gold and silver lace, plate, etc. by photographers for removing silver stains, and by electro platers, the ordinary electro plating solution being silver evanide dissolved in evanide of potassium solution Tatal cases have been reported from swallowing this solution as well as from swallowing cyanide of potassium, and serious symptoms have arisen from the absorption through abrasions on the skin of cyanide of potassium employed for the purpose of removing silver stains from the hands. Two and a half grains of pure potassium cyanide may be regarded as a minimum fatal dose. The commercial salt is, however, generally impure from the presence of potassium carbonate produced by the action of the carbon dioxide of the air on the evanide. In an exceptional case recovery took place after swallowing more than half an ounce of the commercial salt. The symptoms, etc. are the same as in poisoning by hydrocyanic acid Prohably, however, after death more evidence of irritation will be found

Case — Cyanida possening — Corrosive action.— A case, remarkable for the corrosive effects of the crude drug owing to contamination with carbonate and caustic potens is reported by Dr. A. Towell. The angle of the type the muccess of the tenging checks, phasyxx, and exceptages was altered leaving a real raw surface. On section the epithelium was found to have desappeared except from the electron of the epithelium was found to have desappeared except from the electron of the epithelium was found to have desappeared except from the lectron of the epithelium was found to be a few of the contaminations of the electron o

Cases - Frussic acid poisoning by cyanides - Suicidal - (a) A respectable-looking Bengali Hindu, aged about 23 years was found dead on a bench in the Edon Gardens Calcutta on the 11th July. 1899 A bottle containing eyanule of potassium was found tied in his chaddar. In his right hand were found three lumps of potassium organde, a reddish froth was issuing from his nouth. In the pocket of his coat was found a train ticket for the Chitpore car. Some prepared betch, a hufe, and a slice of ripe mango were found close to the dead body. The body could not be identified. The viscera were forwarded for cliemcal examination, and prussic acid was discovered in them. It is evident that the man went to the Eden Garden's to commit suicide by taking (junde of potassium Cyanule of potassium sinches fatal case, in 1899, a glider committed by dimiking some silverengs solution (cyanule of steer disvisories and cyanule of potassium)—L. A. Waddell, Beng Ohen Ex. Rept., 1899.

Case—Cyande of potassum—Succide—A Luropean assistant in a firm calcutta, aged about 40 years, was found lying idead across his bed The post morten examination revealed the presence of intense congestion of the mucous membrane of the stomach and duodenium, all the other internal organs were also congested. The stomach continued about five uncess of a watery fluid sincelling of hydrocyanic acid. Oganide of potassium was detected in the viscera—C. L. Bose, Beng. Chem. Fix. Rept., 1911.

Case -- Homicidal cyanide poisoning with John Hunter as medical witness -G V Poore, in the Clinical Journal of August 23, 1899, discusses evanide poisoning, and cites the case of the King v Donellan The case is especially interesting, as the celebrated John Hunter made his appearance upon the witness stand in that case In 1780 Captain Donellan was put upon trial for the murder of his brother in law Sir Theodosius Boughton Donellan and Boughton lived in the same house, and it was known that the former would benefit pecuniarily by the death of the latter An apothicary had prescribed for Boughton, and the draught, which was supposed to be a purge, was administered by the mother of the deceased, though she noticed when administering it that it smelled of bitter almonds Boughton died half an hour after taking it in convulsions Donellan emptied and rinsed out the bowl which had contained the draught Captain Donellan had a chemical still in his room, which he had given to a servant to clean a few days previously, it having been recently used. The medicine which had been administered by the anothecary contained no oil of bitter almonds. The body of Boughton was exhumed and evidences of congestion were found. Hunter was called as a witness He testified that the post mortem signs were all due to putrefaction, and that death might have been due to apoplexy, the head not having been opened, it was impossible to say whether this was so Being asked in cross examination whether the fact of a man in perfect health, dying in convulsion immediately after swallowing a draught, did not point to poison, he replied ' If I knew the draught were poison, I should say most probably that the symptoms arose from that, but when I do not know that the draught was porson—when I consider that a number of other things might occasion his death-I cannot answer positively to it " Hunter admitted that it was not very probable that Sir Theodosius Boughton died of apoplexy The final question asked by the Court was "Give me your opinion in the best way you can one way or the other, whether, upon the whole of the symptoms described death proceeded from that medicine or from any other cause 'to which Hunter answered "I do not mean to equivocate, but when I tell the sentiments of my own mind The judge made what I feel at the time-I can give nothing decisive

the following comment on the testimony of Mr Hunter "For the prisoner you have had one gentleman called , he is likewise of the faculty, and a very able man I can hardly say what his opinion is, for he does not seem to have formed any opinion at all of the matter He, at first, said he could not form an opinion whether the death was or was not occasioned by the posson, because he could conceive that it might be ascribed to other causes I wished very much to have got a direct answer from Mr Hunter, if I could what upon the whole was the result of his attention and appli cation to the subject and what was his present opinion, but he says be could say nothing decisive So that upon this point if you are to deter mine upon the evidence of the gentlemen who are skilled in the fixults only you have the very positive opinion of four or five gentlemen of the faculty that the deceased died of porson On the other hand, you have what I really cannot myself call more than the doubt of another, for it was agreed by Mr Hunter that the laurel water would produce the symptoms which are described He says an epilepsy or an apoplexy would produce the same symptoms, but as to apoplex: it is not likely to attack so young and so thin a man as Sir Theodosius was, and as to endepsy the other witnesses tell you that they do not think the symptoms which have been spoken of do show that hir Theodosius had any epilepsy at the time ' The jury brought in a verdict of guilty and Captain Donellan was executed a few days thereafter A remarkable circumstance which came to light afterwards was that a still that had been recently used was discovered on the primises Donellan was so bad a chemist that on being asked for what purpose he had procured this machine he replied "I used it to make lime water to kill flies. In his laboratory there was found a single number of the Philosophical Transactions, and of this volume the leaves had been cut in only one place which opened to an account of the mode for making laurel water by distillation. John Hunter, in the of imon of Poore made a phenomenally bad witness, yet he says that one cannot help acreeing with many of the doubts that Hunter raised in this case.

Mercuric cyanide.—This, already mentioned as a poisonous mercuric salt, according to some authorities, acts like hidrocyanic acid. Silver cyanide also, from experiments on animals appears to act like hidrocyanic acid but is much weaker; it contains cyanogen equal to about 1 th of its weight of hidrocyanic acid. A case of attempted suicide by swallowing cyanide of silver, in which recovery took place under prompt treatment, occurred mar Poona a few years aco

Case — Homudal cyande possoning by post.— Several cases of evanide possoning by the post occurred in Now York in 1888. In one of these, II C Barnet, whose death was deliberately planned, dil not die until after ten days illness — Medicane, February, 1889, p. 174

Potassum ferrocyanide.—Yellow prassuate of potash under ordunary circumstances, is either not poisonous or only very feebly porsonous. When acted on by acids, however, it yields HCy. In one case, death resulted from swallowing a dose of the salt, followed by one of tartare acid, and in another, from swallowing a dose of the salt, followed by a mixture of intrine and hydrochloric and of Other ferrocyanic is probably act.

similarly to potissium furrocyanide Potassium sulphocyanide is pots mous but not very active The cynnics (from cyanic and HCNO) are asserted to be non poisonous. Cyanuric and however, Blyth states causes symptoms and effects similar to those produced by hydrocyanic acid

Other cardiac poisons — In addition to the foregoing the following vegetable irritants already described a pear to possess an action on the heart similar to those possessed by digitalin Scillitin the active principle of squill and probably also superbine from Gloriosa superba Helleborein from Hilleborius nuger and H viride Anomonin from Anemone

pulsatilla, etc , and Adonidin, from Adonis ternalis

An action on the heart similar to that of digitalin appears also to be possesse! by the following Antarin, a glucoside contuned in Antaris toricaria a native of Java where the milky juice of the plant is used as an arrow poison. Strophantin a poisonous principle continued in Strophantin kispidus, NO Apocynacca—Apocynin a poisonous principle contained in the root of Apocynum cannal inum. Erythrophlenie an alkaloud obtained from the brik Erythrophleniem guineense a native of West Africa. Foonymin a glucoside contained in Euonymus and by Tan\_hinia venenifers or Midagascar ordeal poison. Saponin and several vegetable irritants appear to possess an action on the heart similar to that possessed by digitonin.

### Asphyxiants

Carbon dioxide, carbonuc acid gas—The gas is a product of respiration combustion and termentation and of the decomposition of organic matter. It is also evolved during the decomposition of carbonates by heat as in time burning, or by acids as in the chemical preparation of the gas. Poisoning by carbon dioxide is usually accidental. In some countries however e.g. France exposure to the fumes arising from a pan of burning charcoal placed in a room the door windows etc of which brige beau highly closed is a favourite method of committing suicide. (See also Carbon monoxide.)

Accidental cases may arise from the carbon dioxide disengaged in any of the ways mentioned above. For example from carbon dioxide evolved as a product of (1) Respiration is when they occur in consequence of a number of persons sleeping in a small badly ventilated room. (2) Combustion in a similar way to the suicidal cases mentioned above. Accidental

 $^{2}$   $^{2}$ 

cases of this kind have occurred in India (see Cusc (a) below) Under this head also come cases of poisoning by 'choke damp,' or carbon dioxide, formed as a product of coal-mine explosion (3) Fermentation, carbon dioxide, evolved in this way is hable to accumulate in vats, in which fermentation has been conducted. eg brewers' vats rendering descent into the vat, in order to clean it, dangerous to life (4) Decomposition of organic matter Carbon dioxide thus produced is liable to collect in old wells. pits. vaults, etc., and to give rise to accidents. Descending into pits used for storing grain, which have been closed for some time, may result in death from carbon dioxide poisoning A case of this kind occurred in 1888, in the hold of a ship at Calcutta (see Case (a)) (5) Decomposition of carbon tes Persons sleeping close to a lime kiln have died of carbon dioxide poisoning, and Taylor mentions a case of accidental poisoning, arising from the use of chalk to neutralize a quantity of nitric acid which by accident had leaked into a room

Cases—Accidental poisoning by Carbon Dioxide—(a) Dr Moffat reports that four men were brought one morning to the dispensary at Nami Tal in a state of insensibility. They had been found in a closed room 6 × 8 × 7 feet with a pan of charcoal between them. The previous night had been a very cold one. Of the four one never recovered sensibility, and died shortly after admission. The other three are described as being, soon after admission, in a drowey semi conscious state, when shaken and spoken loudly to they could be made to sit up and answer questions Their eyes had a filmy look, the pupils were dilated, the pulse small and weak Two of the three recovered com-pletely, the third was attacked with ordernatous crysipelas, and died four days after admission.—Ind Ved Gar 1877, p 184 (b) A very similar case, in which five persons were poisoned of whom one died, occurred at Nowshera .- See to . March 1885

Cases -Poisoning by gases from decomposing grain -(a) In 1888 thirteen men were poisoned by gas in the hold of the steamer Clan McIntosh at Calcutta A few days infore the catastrophe a lot of fodder (hay) which had been kept on dock in one of the sheep pers was, owing to heavy weather, put into the lower storeroom which also contained some bags of grain paddy gram, barley, etc. This fodder may have got wet before it was removed below, but there was no evidence to show whether these articles had actually become damp because the lower storeroom was flooded with water after the bodies had been recovered There was no leak into the storeroom, but a leak was discovered close by, and one of the witnesses thought it possible that leakage may have taken place into the room An unpleasant smell of bilge was observed about the place for a few days previous to the accident, and this was traced to the entilators of the upper storeroom. It was probably this amell that induced the chief steward, accompanied by three firemen to visit the lower storeroom. They were observed to fall down, and several of the officers and crew promptly descended into the hatchway for the purpose of bringing them up. The light which they carried went out, and they speedily became insensible Of thirteen persons who entered the lower storeroom eight revived on being brought on deck

remaining five bodies were not recovered for two hours and a half, and when they were, lide was extinct. The surgeon of the ship was in attendance, and rendered every aid in his power. He deposed that the five men died of asphyxia, and that the eight who recovered suffered from symptoms of asphyxia. He thought this was due to a mixture of carbureted hydrogen gas and carbonic caide. (b) Ind. Med. Gas for 1874, p. 295)—Dr. Garbner, of Saharumpur, reports a case in which three men died shortly after descending into a pit used for the purpose of storing grain. The pit had just been opened, but instead of, as is customary, leaving it open for some time before allowing any one to descend, the owner, being afraid of min, sent his sertants, four in number, down at once. The fourth man was also attacked, but recovered The post mortem appearances in the three fatal cases were those of death from apaa.a, with numerous sub plural ecohymoses, of a dark purple colour.

Symptoms.—When undiluted, carbon dioxide causes spasm of the glottis and death from apneas, diluted, it appears to act as a narcotio poison, causing narcotism, followed by coma and death. The more the grs is diluted, the more gradually it produces its effects. If much diluted, thero is at first headache, giddiness, and singing in the ears, gradual loss of muscular power. Usually the face is lived, and there is palpitation, and lurried respiration. Gradually narcotism supervenes, deepening into coma with stertorous breathing.

Sometimes younting and convulsions are present.

Totic percentage —Considerable difference of opinion exists on the question, what percentage of carbon dioxide present in air may be considered to render it poisonous? When carbon dioxide is simply added to air containing its normal percentage of oxygen, probably eight to ten per cent.—some say more—would be required. When developed at the expense of the oxygen of the air by respiration, probably five per cent. would suffice; very much less than this would probably cause distress in most persons, and two per cent, it is stated, occasions severe suffering. When developed at the expense of the oxygen of the air by combustion, carbon monoxide is usually at the same time formed, which, being more poisonous than carbon dioxide, augments the toxic action of air vitiated in this way. It is very important to note that a candle will continue to burn in air containing a poisonous percentage of carbon dioxide.

Post mortem signs.—The face may be pale or hvid and swollen. The tongue is often protruded and grasped by the teeth; sometimes there is froth at the mouth and nostrils.

<sup>&</sup>lt;sup>1</sup> It is alleged by some that carbon dioxide is not poisonous, and that its apparently poisonous action on animals is simply due to their being deprived of oxygen.

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Internally the appearances are similar to those of death by appear. Usually there is much congestion of the brain and its membranes and of the abdominal viscers.

Treatment—Remove the patient at once into pure air [Endeas our to restore sensibility by cold affusion and galvanism Triploy artificial respiration and if there is much congestion, moderate bleeding may be resorted to Obviously if a person on descending into a pit or vat is seen to fall immediately insensible from poisoning by carbon diexide to allow others to descend to his rescue is apt to lead only to a useless waste of life. Taylor cites a case where two men lost their lives in this way in attempting to rescue a boy who had fallen into a brewer's at Before persons are allowed to descend the carbon dioxide should be chased out by driving fresh air into the pit or vat, or line may be thrown down to absorb the gas

Quantitative po soning -This may be effected by filling a large narrow necked vessel of known capacity with the air to be examined and adding a measured quantity of I me water the alkalinity of which has been hist ascertained by a standard solution of oxelic acid. The sessel is then tightly closed well shaken and allowed to remain at rest for twenty four hours. After this the bottle is opened the fluid poured out a measured quantity (say equal to hulf the volume of the fluid originally poured into the bottle) separated and the loss of alkalinity ascertained by titrat on as before with standard oxalic acid solution The loss of alkalimity of the whole fluid corresponds to the amount of lime converted into carbonate by the carbon dioxide contained in a quantity of the air under examination equal to the capacity of the vessel minus the volume of lime water used. The quantity of carbon dioxide likely to be present in an enclosed space eg a room in which the air has been vitated by respiration or combustion may be approximately estimated from the following data. Normal air contains on an average four volumes of carbon dioxide per 10 000 of air Each adult may be considered to give out from a half to six tenths of a cubic foot of carbon d oxide per hour! A candle or small lamp gives off about half a cul ic foot per hour charcoal has been burnt in the room the amount of carbon dioxide? evolved may be approximately inferred from the weight of the residual Poughly one pound of chargoal corresponds to twenty nine cubic feet of carbon dioxide, and leaves about half an ounce of ash Carbon dioxide is about half as heavy again as air of the same temperature. Like other gases it expands and becomes lighter as the temperature rises Gases however diffuse into one another even against gravity for a certain time after it has been evolved hot carbon dioxide will be found in greatest quantity in the upper and cold carbon dioxide in the lower strata of a confined portion of air After a time however the Las will have become uniformly distributed by diff ision. After this has taken place separation by gravity tipes not becur

## Carbon Monoxide, or Carbonic Oxide - Carbon monoxide

into carbon monoxide which is more poisonous than carbon dioxide

As the air gots vitiated the amount given out par hour decreases a little.
A portion of the carbon however will probably have become converted

is obtainable by passing carbon dioxide over red-hot charcoal A certain quantity of it is always formed during the combus tion, under ordinary conditions of charcoal or other carbo naceous fuel, the amount being greatest when the combustion is least active, and tice tersa It is a powerful narcotic poison much more powerful than carbon dioxide Death from inhalation of the products of combustion, eg the fumes of buining charcoal, is probably in many cases due to carbon monoride poisoning After death from poisoning by carbon monoxide, the blood is found bright red in colour, not darkened, as in carbon dioxide poisoning This is held to be due to the carbon monoxide forming with the hamoglobin of the blood, a compound of a red colour (carbonic oxi le hemoglobin) It is asserted, by some that this compound is so stable that it cannot be broken up by simple exposure to air or oxygen, and hence, that in poisoning by carbon monoxide artificial respiration is useless, and transfusion of arterial blood the only remedy Others deny this and hold that the compound does break up, on exposure of the blood to an -. .

Care—Carbon monoxide poisoning—In the year 1908 when the Alexandra Docks were being i uith in Bomlay a stack of several hundred tons of coal caught fire. To extinguish the fire earth was thrown on the top of the coal, and water continually opened on As a result of these measures the coal slowly smoot lere I under the covering of earth which shut off the oxygen necessary for active combustion. Tachty three of a gang of coolies engaged in carrying the earth became first lethiage, and then lay down at the food of the stack and became unconscious. A European commit with the top of the control of the stack and became unconscious. A found of the control of the stack and became unconscious. A foundation of the control of the stack and became unconscious. A foundation of the control

Coal gas.—The e-cape of this gas into badly rentilated rooms has frequently given rise to narcotic poisoning. The chief (according to some the only) poisoning constituent of coal gas is carbon monoxide. The quantity of carbon monoxide present varies in different specimens. Usually the amount present is 5 to 11 per cent, but as much as 22 per cent has, it is stated, been found. The constituent usually present in largest quantity in coal gas is methane or light carburetted hydrogen (40 to 45 per cent or more). Methane, even when present in air in quantity sufficient to form an explosive mixture (5½ per cent or over), appears to exert little or no tovic action. It is presence in air however is a source of danger to life from the risk of an explosion which may cause mechanical injury or result in poisoning by carbon di

#### 710 CEREBRO SPINAL AND CARDIAC POISONS

Sewer gas may contain, in place of sulphuretted hydrogen, trapour of hydrosulphide of ammonium, which appears to be equally poisonous. Or aguin, sewer gas may only contain sulphuretted hydrogen in small quantity, and but little carbon dioxide, but still produce asphyxia in those breathing it, owing to its consisting almost wholly of nitrogen, i.e. of deoxidized air

Sulphuretted Hydrogen, H.S -The decomposition of organic matter may result in the production of this gas, directly when the matter under poing decomposition contains sulphur, indirectly, when the decomposition takes place in presence of a soluble sulphate - In the latter case the sulphate yields a sulphide which, when acted on by carbonic or other acids evolves H.S. Accidental poisoning by sulphuretted hydrogen is hable therefore, to occur from exposure to the emanations from decom posing organic matter ca in cesspools or sewers. This liability is increased if an acid it juid finds its way into the sewer. It was to this Dr Lethby attributed the accident in the Picet Lane sewer in February. 1861 Agrication also, of the liquid in the sewer, etc., favours the evolution of the gas Symptoms -When concentrated, it causes immediate When dilute it gives rise to nausea and the usual symptoms of narcotic poisoning eg headache, giddiness, and laboured respiration followed by coma Sometimes delirium and tetanic convulsions are When very much diluted the symptoms are chiefly nausea and abdominal pain, with febrile disturbance -I ost mortem signs -The body. exhales an offensive odour, putrefaction is rapid and the blood is fluid and dark coloured there is a general congestion of the viscera and engorgement of the right side of the heart' Woodman and Tidy lay stress on the presence of a dirty brown deposit smeared over the lining membrane of the bronchial tubes as characteristic of death from sul phuretted hydrogen. TREATMENT - Immediate removal into pure air. cold affusions, stimulants and inhalation, as an antidote, of dilute chlorine, as in hydrocyanic poisoning Detrotion -Free sulphuretted hydrogenia readily recognized by its characteristic odour of rotten eggs, and by its blackening paper moistened with solution of lead acetate Sulphides—those of the heavy metals excepted—are decomposed by dulute acids sulphuretted hydrogen being set free

Nitrous Oude or Laughing gas — This is used as an assethetic instead of cilioroform, and has caused reveral deaths. Death from instalation of laughing gas appears to be due to asphyxia, indeed it has been asserted that the anaschetic effect of the gas is due to the production of temporary asphyxia, owing to the circulation of non-oxygenated blood, the blood having no power to senarate the oxygen contained in this gas the

Carbon Duelphide, Brutlphide of Carbon, CS,—This liquid, owing to its solvent action on sulphur countehous cruinary phosphorus, and other substances is largely used in certain indistines. The vapour of carbon daulphide, from experiments on animals has been shown to be a narcotte poison, acting very similarily to chloroform. Cases of chronic poisoning by carbon distillable vapour have been observed among this work people year that the counterpart of the counterpart of the counterpart of the base cases have been a stage of excitement followed by one of depres soon. The first stage begins with headseth endigestion and nauses, and

Joylet and Blanche, quoted by Taylor, Manual, p 445

ereeping sensations, followed by irritability and excitement of the nervous system, which may terminate in mails. In the second stage there is anisethesia of the skin and mucous membranes, mental debility and muscular weakness which may cultimate in paralysis. The "Poisson gas" deliberately introduced by the Germans for war purposes in 1914 is said to consist mainly of intric oxide and chlorino founes.

### Peripheral Poisons.

These especially act on the motor nerve terminals endplates. There is no recorded instance of poisoning by them in India except by cocaine, see p. 631

Conium.—Consum maculatum, or Spotted Hemlock, N.O. Umbell/feræ; Showkran (Arab), Kırdamana (Bo)—This is a common plant in Europe and temperate Asia. The whole plant has a 'mousey' feetid odour and is poisonous, the leaves and fruit are officinal BP and IP. It was the Athenian State-poison by which Socrates died. Cases of poisoning by contum are somewhat rare

Falck 1 found seventeen recorded in medical literature, of which fourteen were accidental chiefly from the plant being mistaken for parsley or some other harmless herb One case is recorded of a child, who died, poisoned by conium, from blowing whistles made of conium twigs Connum contains a poisonous liquid alkaloul, conia, and a less poisonous crystalline alkaloul conhy lrine These are similar in action, paralysing first the peripheral extremities of the motor nerves, and subsequently their trunks In addition, commercial conia has been found to contain a variable quantity of methyl coner, a liquid volatile alkaloid, which paralyses the cord Identification .- The stem of the plant is described by Guy as tall, smooth, glossy green, and dotted with brownish purple spots The root is tapering and in shape something like a parsnip, for which it has been mistaken. The leaves are deep green, and have often been mustaken for paraley leaves, from which, however, they differ greatly in shape According to the Pharmacographia, the consists of the separated memcarps, fruit, as met with in the shops, which are about one eighth of an inch long The dorsal surface of these have five prominent longitudinal ridges, the edges of which are marked with little protuberances giving them a jagged or crenate outline. The furrows are glabrous, but slightly wrinkled longitudinally, they are devoid of vittee The absence of vittee distinguishes hemlock fruits from other fruits of the same N O All parts of the plant, when bruised and moistened with potassic hydrate solution, give out a peculiar mousey odour Action—The prominent symptoms of conium poisoning are muscular weakness with loss of power to swallow, the weakness deepening into complete paralysis, affecting the extremities first, and after wards the trunk The punils are dilated, there is ptosis, and sometimes convulsive twitchings Consciousness remains until asphysia sets in Death occurs rapidly, by asphysia due to paralysis of respiration usually in one to four hours The medicinal dose of the powdered leaves is two to eight grains, and of the tincture of the fruit-strength 1 to 8-

<sup>1</sup> Blyth, Poisons p 253

20 to 60 minims. According to Woodman and Tidy, one drop of the sikaloid conia may be regarded as a poisonous dose. Treatment.—General, as for spinal poisons. Post mortem—As in death by appirat.

Come may be separated from organic mixtures by Star' process, using periodeum either as a solvent, and conducting all exporations, etc., at a low lemperature. It is recognized by its peculiar monacy like offour and its action on animals. Schwarzenbach 'giver the following colour test for cools. "If dropped into a solution of alloxan, the fatter is coloured after a few minutes, and intense purple red and with needle shaped crystals are separated, which dissolve in cold potash by into a beautiful purple blue. Const. congulares allumen, and gives an amorphous precipitate with mercuric chloride solution these characters distinguish it chemically from monotine (see n. 67.5).

Curari, or Wourali.—This substance, also called Urars or Turnas, is a black resinoid mass almost wholly soluble in water, used by the South American Indrans as an arrow-poison. It is believed to be an extract from a species of Strychnes, probably S tax/fera, mred with other matters. When swallowed, it usually causes no symptoms of poisoning Introduced into a wound, it acts like coma, paralysing the motor nerves, and causing death by paralysis of respiration It contains an alkaloid, cursing, sparingly soluble in chloroform, and grung a purple colour with strong nitter acid.

Guran was one of the poisons arranged to be used in a faintful plot to poison the Prime Minister, Lloyd George, in 1917, and the intention was to smear it over a protrading nail in the sole of his boot—to act like a serpent's tooth in introducing the poison hypodernically

The following alkaloids are similar in action to coma and curin — Sparteine, a liquid volatile alkaloid, contained in common broom biaphisagrine, one of the alkaloids contained in statesacre (see p. 640), and Methyl strychnia, Velbyl krucia, and Methyl thehaa, alkaloids obtained from respectively strychnia, brous, and thebala by the substitution of methyl for hydrogen. It may be noted that this substitution in the case of the alkaloids just mentioned converts central into peripheral spinnel poisons. In the case of comis, a similar substitution converts a primeral into central spinnal poison (see Methyl comis, pr

672 and 711)

The Somalia on the East Coast of Africa prepare for hunting and war a paralysing arrow poison from the extract of the root of \*Oubsin\*, a tree allied to the Gerisse ackimper. The term would seem to be used perhaps in a general sense, for one form of Oubsin brought from the Wood and leaves of Locksuffers schimper, and it also proved to be a most virulent paralysing poison of the motor nerve terminals, like that folianced from an allogether different genus

## APPENDICES.

I

## QUESTIONS FOR MEDICAL WITNESSES.

(From Departmental Circulars of 1st 1 ebruary 1864, 4th March, 1892)

When a case arises requiring medical opinion the police officer should forward the subject to the medical officer, with such a general description of what is known of the case that the attention of the medical officer may be turned in the right direction. A printed form is provided for the purpose, and should always be used. The reference may be made in English or in the vernacular, as the case may be

2 The result of the medical officer's examination, together with his opinion on the case will be entered in that part of the printed form provided for the purpose, and the form so filled up

will be returned to the police

3 The police officer, having received the report of the medical officer, will send up the case according to rule to the magistrate, sending with the chalan the form containing the reference to the medical officer and his reply thereto. On the list of witnesses

will appear the name of the medical officer

4 The only use of the medical officer's report will be to assist the police in getting up the crose, to refresh the memory soft the medical officer at the time of gring his deposition, and to aid the judicial officer in framing his queries. It cannot be admitted as evidence (except under clause (2), s 32 of the Lyidence Act); nor is it sufficient to read it over to the medical officer and swear him to the truth of it, his deposition must be recorded de novo and at length in the presence of the accused

<sup>&</sup>lt;sup>1</sup> Circular 55—Where a post mortem examination is necessary the corpse will be forwarded to the nearest civil surgeon or other medical officer appointed in this behalf by the Local Government under s 174 Code of Criminal Procedure

The magnitude should therefore look into the case and make himself acquainted with its particular features before the medical officer enters the court in order that the proper questions may he asked

5 Care should always be taken to record the medical evidence so fully and intelligently as to render a second

examination of the witness by another court unnecessary

6 With a view of assisting magistrates in the task of asking suitable questions a list of questions which suggest themselves in each class of cases is appended to which the magistrate can

refer at the time of the examination

7 Before the medical officer leaves the court his deposition is to be fully interpreted to the accused who is to be allowed to cross-examine. In order to ensure that the medical officers deposition may in all cases be admissible under a 509 Criminal Procedure Code the magistrate must sign at the foot of it a certificate in the following form.

The foretoing deposition was taken in the presence of the accused who had an opportunity of cross examining the witness. The deposit on was explained to the accused and was attested by me in his presence.

This is of course specially necessary when the deposition is taken in an inquiry preparatory to commitment to the

- 8 Whenever a medical officer is examined as to the result of his examination of any person corpse or substance evidence should always be taken to prove that the person corpse or substance examined by him and to the examination of which he testifies is the person corpse or substance in question in the case.
- 9 For this purpose the evidence of the persons conveying the corpse or substance to the medical officer should be taken, and in cases where the examination by the medical officer of a living person is in question the identity of the person examined by him with the person in question in the case should be placed beyond doubt by actual identification in court if the person is able to be present and if not by the evidence of the person who conducted him to the medical officer
- 10 If in any particular case the evidence of a medical witness is not to le had the details such as fact of death symptoms appearances wounds must be made out as correctly as possible from the evidence of non piofessional eje witnesses. The courts cannot assume any such facts from mere reports not admissible as evidence. Police officers can always be put into the witness box to bear witness to what the jaw.

#### A

Questions which may be put to a medical witness in a fatal case of suspected Poisoning after post mortem examination of the body

1 Did you examine the body of ---, late a resident of

- and if so what did you observe? 2 What do you consider to have been the cause of death?

State your reasons 3 Did you find any external marks of violence on the

body? If so describe them

4. Did you observe any unusual appearances on further

examination of the body? If so describe them 5 To what do you attribute those appearances—to disease. poison or other cause?

6 If to poison then to what class of poisons?

7 Have you forme I an opinion as to what particular poison was used?

8 Did you find any morbid appearances in the body besides those which are usually found in cases of poisoning by ----? If so describe them

9 Do you know of any disease in which the jost mortem appearances resemble those which you observed in this case?

- 10 In what respect do the post morten appearances of that disease differ from those which you observed in the present Cage ?
- 11 What are the symptoms of that disease in the living?
- 12 Are there any post mortem appearances usual in cases of poisoning by —— but which you did not discover in this instance? 13 Might not the appearances you mention have been the
  - result of spontaneous changes in the stomach after death?

14 Was the state of the stomach and bowel compatible or incompatible with vomiting and purging?

15 What are the usual symptoms of poisoning by ——? 16 What is the usual interval between the time of taking the poison and the commencement of the symptoms?

17 In what time does ---- generally prove fatal?

18 Did you send the contents of the stomach and bowels (or other matters) to the chemical examiner?

19 Were the contents of the stomach (or other matters) sealed up in your presence immediately on removal from the body'?

20 Describe the vessel in which they were sealed up, and what impression did the seal bear ?

21 Have you received a reply from the chemical examiner? If so is the report now produced that which you received?

22 (If a female adult) What was the state of the uterus?

B.

ns that may be put to non professional witnesses in a Case of Suspected Poisoning.

Myou know ---, late a resident of ---- If so, did you see hills during his last illness and previously?

2 What were the symptoms from which he suffered? 3 Was he in good health previous to the attack?

4 Did the symptoms appear suddenly ?

5 What was the interval between the last time of eating or drinking and the commencement of the symptoms?

6 What was the interval between the com (If dea h occurred ) mencement of the symptoms and death?

7 What did the last meal consist of?

8 Did any one partake of this meal with ----?

9 Were any of them affected in the same way? 10 Had —— ever suffered from a similar attack before?

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14. Was --- very thirsty?

15 Did he become faint?

1b Did he complain of headache or giddiness?
17 Did he appear to have lost the use of his limbs.

18 Did he sleep heavily?

19 Had he any dehrum? 20 Did convulsions occur?

21 Did be complain of any peculiar taste in the mouth?

22 Data no morace may peculnar taste an mas food or water? 23 Was he consible in the intervals between This is with reference to hux tomica. the convulsions?

24 Did he complain of burning or tingling This is with reference in the mouth and throat, or of numbness and

tingling in the limbs?

C

Questions which may be put to a medical witness in a case of supposed Death by Wounds or Blows after post mortem examination of the body

1 Did you examine the body of --- late a resident in the

- and if so, what did you observe? 2 What do you consider to have been the cause of death?

State your reasons 3 Did you find any external marks of violence on the

body? If so, describe them

4 Are you of opinion that these injuries were inflicted before or after death? Give your reasons

5 Did you examine the body internally? Describe any unnatural appearance which you observed

6 You say that in your opinion --- was the cause of death. in what immediate way did it prove fatal?

7 Did you find any appearance of disease in the body? 8 If so do you consider that if the deceased had been free

from this disease the injuries would still have proved fatal? 9 Do you believe that the fact of his suffering from this disease lessened his chance of recovery from the injuries

sustained?

10 Are these injuries taken collectively (or is any one of them) ordinarily and directly dangerous to life?

11 Have they been caused by manual force or with a weapon?

12 Did you find any foreign body or foreign matter in the wound?

13 By what sort of weapon has the wound been inflicted? 14 Could the injuries have been inflicted by the weapon

now before you (No ---- Article in evidence)?

15 Could the deceased have walked (so far) or spoken, &c.

after the receipt of such an injury?

16 Have you chemically or otherwise examined the stains (on the weapon, clothes &c ) now before you (No - Article in Evidence)?

17 Do you believe the stams to be those of blood?

18 What time do you think elapsed between the receipt of the injuries and death? 19 What was the direction of the wound and can you form

an opinion as to the position of the person inflicting such a wound with respect to the person receiving it?

20 Is it possible for such a wound to have been inflicted by any one on his own person?

(In gur hot wounds) 21 Give the precise direction of the wound

- 22 Did the appearances of the wound indicate that the gun had been discharged close to the body or at some distance from 1t?
- 23 Did you find any slug bullet, wadding &c, in the wound or had --- made its exit?
- 24 Do you think it possible that you could have mistaken the aperture of entrance for that of exit?

## D

Questions that may be put to a medical witness in a case of supposed Infanticide, after post mortem examination of the bods

- 1 Din you examine the body of a male child sent to you by the District Superintendent of Police on the --- of --- 19 .
- and if so what did you observe? 2 Can you state whether the child was completely born alive partially born alive or born dead? State the reasons for
- your opinion 3 What do you consider to have been the cruse of death?
- Give your reasons 4. What do you believe to have been the uterine age of the
- child? State your reasons
- 5 What do you believe to have been the extra uterine age of the child? Give reasons
- 6 Did you find any marks of violence or other unusual
- appearances externally? If so, descrile them accurately 7 Did you find any murbid or unusual appearances on examination of the body internally? If so describe them
- accurately 8 Do you believe the injuries you observed to have been
- inflicted before or after death? Give reasons
- 9 Can you state how they were inflicted? Give reasons 10 Do you consider that they were accidental or not? Give reasons.
  - 11 Had the infant respired fully, partially, or not at all?
- Did you examine the person of ----, the alleged mother of the infant? If so, have you reason to suppose that she was recently delivered of a child? Can you state approximately the date of her delivery? Give reasons

Questions that may be put to a medical witness in a case of supposed death by Hanging or Strangulation.

 Did you examine the body of ——, late a resident of ——. and, if so, what did you observe?

2. What do you consider to have been the cause of death?

State the reasons for your opinion

3. Did you observe any external marks of violence upon the body?

4. Did you observe any unnatural appearances on examina-

tion of the body internally?

5. Was there any rope or other such article round the neck when you saw the body?

6 Can you state whether the mark (or marks) you observed

were caused before or after death?

7. By what sort of articles do you consider the deceased to have been hanged (or strangled)?

8. Could the mark you observed have been caused by the rope or other article now before you (No. - Article in

Evidence)? 9. Do you think that this rope could have supported the

weight of the body?

10. Would great violence be necessary to (if strangulation ) produce the muries you describe?

#### F.

Questions that may be put to a medical witness in a case of supposed death by Drowning, after post mortem examination of the body.

1. Did you examine the body of ----, late a resident of ----, and, if so, what did you observe?

2. What do you consider to have been the cause of death?

State your reasons. 3. Were there any external marks of violence upon the

body? If so, describe them. 4. Describe any unnatural appearances which you observed

on further examination of the body. 5 Did you find any foreign matters, such as weeds, straw.

etc, in the hair, or clenched in the hands of the deceased, or in the air passages, or attached to any other part of the body?

6. Did you find any water in the stomach?

G

Questions that may be put to a medical witness in a case of alleged Rape.

- 1 Did you examine the person of Mussainut ——? If so. how many days after the alleged rape did you make the examination, and what did you observe?
- 2 Did you observe any marks of violence about the vulya or adjacent parts?
- 3 Are these injuries such as might have been occasioned by the commission of rape?
  - 4 Was the hymen ruptured? 5 Did you observe any further marks of violence upon the
- person of the woman? 6 Had she passed the age of puberty ?
- b from the gassett the ago of process, it is a series of the sale in the ago of process of the ago of the sale in the ago of the ago
- weakly as to be unable to regist an attempt at rape? 9 Did you examine the person of the accused?
  - 10 Did you observe any marks of violence upon his body?
  - 11 Was he suffering from any venereal disease? 12 Did you find the woman suffering from a similar or
- other venereal disease? 13 Had a sufficient time elapsed, when you examined the person of the woman, for venercal disease to have made its
- appearance in case of her having been infected? 14 Can you state approximately how long the defendant
- had been suffering from this complaint? 15 Can you state approximately how long the woman had
- been suffering from this (venereal) complaint? 16 Have you examined the stained articles forwarded to
- you and now in Court (No Article in Lyidence)? 17 What is the result of your examination?
- 18 Do you believe that a rape has been committed or not? State your reasons

#### H.

Questions that may be put to a medical witness in cases of suspected Insanity.

- 1 Have you examined ----?
- 2 Have you done so on several different occasions, so as to

preclude the possibility of your examinations having been made during lucid intervals of insanity?

3 Do you consider him to be capable of managing himself and his personal affairs?

4 Do you consider him to be of unsound mind, in other words, intellectually insane ? 5 If so, do you consider his mental disorder to be complete

or partial?

6 Do you think he understands the obligation of an oath? 7 Do you consider him in his present condition, competent

to give evidence in a Court of Law? 8 Do you consider that he is capable of pleading to the

offence of which he now stands accused?

- 9 Do you happen to know how he was treated by his friends (whether as a lunatic an imbecile, or otherwise) prior to the present investigation and the occurrences that have led to it?
  - 10 What, as far as you can ascertain, were the general
- characteristics of his previous disposition? 11 Does he appear to have had any previous attacks of insanity ?

12 Is he subject to insane delusions?

- 13 If so, what is the general character of these? Are they
- harmless or dangerous? How do they manifest themselves? 14 Might such delusion or delusions have led to the criminal
- act of which he is accused? 15 Can you discover the cause of his reason having become

affected? In your opinion, was it congenital or accidental? 16 If the latter, does it appear to have come on suddenly

or by slow degrees?

- 17 Have you any reason for believing that his insanity is of hereditary origin? If so please to specify the grounds for such an opinion and all the particulars bearing on it, as to the insane parents or relatives of the accused the exciting cause of his attack, his age when it set in, and the type which it assumed
- 18 Have you any reason to suspect that he is, in any degree feigning insanity? If so, what are the grounds for this belief?

19 Is it possible, in your opinion, that his insanity may have followed the actual commission of his offence or been caused by it?

20 Have you any reason to suppose that the offence could have been committed during a lucid interval, during which he could be held responsible for his act? If so, what appears to have been the duration of such lucid interval? Or, on the contrary, do you believe his condition to have been such as altogether to absolve him from legal responsibility?

21 Does he now display any signs of homicidal or of suicidal

mann or has he ever done so to your knowledge?

22 Do you consider it absolutely necessary from his present condition that he should be confined in a lunatic asylum? cr

23 Do you think that judicious and unremitting supervision out of an as flum might be sufficient to prevent him from endangering his own life or property of others?

T

Questions that may be put to a medical witness in a case of alleged Causing Miscarriage (ss 312-316 I P C)

1 Did you examine the person of Mussamut ——? If so when? and what did you observe?

2 Are you of opinion that a miscarriage has occurred or

not? Give your reasons

- 3 In what mode do you consider the miscarriage to have been produced.—whether by violence per vaginam or ly external violence or by the use of irritants internally? Give your reasons
- 4 It is alleged that a drug called was used, state the symptoms and effects which the administration internally of this drug would produce Do you consider that it would produce miscarriage?

5 Can you state whether the woman was quick with child

when the miscarriage was produced? State your reasons

when the miscarriage was produced ( State your reasons 6 Did you see the fectus? If so at what period of gestation do you consider the woman to have arrived?

J

Questions that may be put to a medical witness in a case of Grievous Hurt

1 Have you examined ——? If so state what you

2 Describe carefully the marks of violence which you observed

- 3 In what way do you consider the injuries to have been inflicted? If by a weapon, what sort of a weapon do you think was used?
- 4. Do you consider that the injuries inflicted could have been caused by the weapon now shown to you (No ——Article in Evidence)?
- 5 What was the direction of the wound? and can you form an opinion as to the position of the person inflicting such a wound, with respect to the person receiving it?

6 Is it possible for such a wound to have been inflicted by

any one on his own person? Give your reasons

The magistrate in putting this question will abow the I, I

ath they the L. I. at 7 Do you consider that the injuries inflicted or the mixthree may constitute any of the greeous hurts defined in say the form of the processing a second section of the processing second section is 320 of the Indian Penal Code? If so which itensification to them? Give your reasons without allies the processing second secon

8 Do you consider that the person injured is now out of

danger?

9 It is alleged that the injuries were caused by—— Could

they have been caused in the manner indicated?

10 Have you chemically or otherwise examined the stains (on the weapon, clothes, etc.) now before you (No —— Article

in Pvidence)?

N B.—In case of the injuries belog gunshos wounds, questions 21

myores open granhots would never the stains to be those to 'vo lift (death by of blood? wounds) may be put to the winner.

Police Code No 189

#### H

## Legal Definitions of an "OFFENCE," and its Detailed PUNISHMENT.

In India offences are defined and the punishment awardable for each offence limited by the Indian Penal Code (Act XLV of 1860), certain general provisions of which may be here considered

A. Acts are not offences if they come under certain general exceptions laid down in the Code The principal of these are, that acts are not offences if done—

I By a child under the age of seven (S 82)

II By a child between the ages of seven and twelve (not as in England between the ages of seven and fourteen), "who has not attained sufficient maturity of understanding to judge of the nature and con-sequences of his conduct on that occasion " (S 83)

III By a person of unsound mind, "il by reason of unsoundness of mind the doer of the act is incapable of knowing the nature of the act,

or that he is doing what is either wrong or contrary to law " (5 81)1 IV By an intoxicated person, but only, provided,

(1) 'the thing which intoxicated him was administered to lum

without his knowledge or against his will," and (2) when by reason of the intoxication so induced, the intoxicated

person is 'incapable of knowing the nature of the act, or that he is doing what is either wrong or contrary to law ' (S 85)

In good faith, and for the benefit of the person on whose body the act is done (under this exception come surgical operations), provided certain conditions are complied with, the chief of which are-

1 That the act must not be intended to cause death

2 That the act must not of itself be an offence independently of any barm it may cause to the person on whose body the act is done, e a causing miscarriage except for the purpose of saving the hie of the mother (S 01)2

A That the act is done with the consent of the sufferer, such con

sent-

a Not being known to the doer of the act to have been given under fear of injury or misconcention of fact.

b Not having been given by a person under twelve years of ago.

c Nor having been given by a person who by reason of unsoundness of mind or intoxication is unable to understand the nature and cou sequence of that to which he gives his consent (5 90)

Consent of the sufferer may, however, be dispensed with, if-

1 He is of unsound mind or under the age of twelve, if the consent of the person having lawful charge of him has been obtained (\$ 89), or 2 The circumstances are such that it is impossible for him to

signify his consent and he has no-person in lawful charge of him from whom it is possible to obtain consent, in time for the thing to be done with benefit. (S 92)

But in those cases where consent is dispensed with, an act which is known to be likely to cause death or grievous hurt, may only be done for the purpose of preventing death or grievous hurt, or for the curing of any grievous disease or infirmity (S 89)

B An offence may be committed by illeral omission (s 82), thus, a woman may commit murder by intentionally omitting to supply her mant with food 4

C. Attempts to commit offences are, in some cases, numeriable under special sections of the Code, eg an attempt to commit murder (a 807), or culpable homicide not amounting to murder (\$ 308), or suicide (\$.809) Attempts not punishable under special sections of the Code are dealt with by a 511 'Whoever attempts to commit an offence punishable by this Code with transportation or imprisonment, or to cause such an offence to be committed, and in such attempt does any act towards the commission of the offence, shall, where no express provision is made by this Code for the punishment of such attempt, be punished with trans portation or imprisonment of any description provided for the offence, for

<sup>&#</sup>x27; See also 'Insanit', p 253 f , also p 389
' See also 'Quusing Miscarriage,' p 315 f.
Younds,' p 103 f ' See 'Infanticide, p 328 f See ' Wounds,' p 103 f

a term of transportation or imprisonment which may extend to one half of the longest term provided for that offence, or with such fine as 19 provided for the offence, or with both " 1

- D The punishments awardable for offences are defined by \$ 53 of the Penal Code to be 1 Death 2 Transportation 3 Penal servitude 4 Imprisonment, which may be either (a) Rigorous, that is, with hard labour, or (b) Simple, that is without hard labour 5 Porfeiture of property. 6 Fine And under Act VI of 1864, whipping may be awarded for certain offences. The chief medico legal points in connection with these punishments are -
- I. Death -This (see \* 368 of Act A of 1882, the Code of Criminal Procedure) must be by hanging Pregnancy may be pleaded in bur of execution "If a woman sentenced to death be found to be pregnant, the High Court shall order the execution of the sentence to be post poned, and may commute the sentence to transportation for life" (C P C, s 382) In India the question by whom the existence or otherwise of pregnancy is to be determined appears to be left to the discretion of the Court In Ingland, according to an old rule of law, in such cases a jury of twelve matrons is empanelled and sworn, to try whether the "prisoner be with child of a quick child 's
- II. Hard Labour -- A medical man may be called on to determine whether a prisoner is in a fit state of health or not to perform certain descriptions of labour, in such a case, the chief points for inquiry would

1 The prisoner's general health

2. His freedom or otherwise from cardiac disease, aneurism or grave disease of the respiratory organs

3 The nature of the labour (if any) he has previously been engaged

on, and whether he has been gaining or losing weight

4 The proportion borne by the labour it is proposed to exact to the weight of the individual, 2 foot tons per 1 lb of body weight being an ordinary, and 3 foot tons per 1 lb of body weight a very hard day s work In many cases labour to be performed may be reduced to foot tons by Haughton's formula, which may be stated as follows Add together the body weight of the individual (in pounds), and the weight (in pounds) carried by him, multiply this by the height (in feet) ascended, plus one twentieth of the horizontal distance (in feet - 1 mile - 5280 feet) travelled, and divide the product by 2210

III Whipping -- Here the principal points are-

1 All females, and all males over forty five years of age, are exempted (C P C, a 393)

2 A medical man may be called upon to certify whether or no an offender is in a fit state of health to undergo this punishment. (C P C.

s 394.)

3 A medical man may, during the execution of a sentence of whipping. be called upon to certify as to the fitness, or otherwise, of the offender to undergo the remainder of the sentence, and should be certify that the offender is not in a fit state of health to undergo the remainder of the sentence, the whipping must be finally stopped, ie the remainder of the sentence cannot at some future period be inflicted (C P C, s 391)

2 See Pregnancy, p 275

<sup>1</sup> See also Causing Miscarriage, p 315 f

#### 111

# (This is cited on p 90.) NECROPSY or POST-MORTEM EXAMINATION DIRECTIONS

The order of examination should always be that here given, unless special reasons of the nature before indicated exist for departure therefrom. Incisions made through the skin for the purpose of opening cavities should avoid already existing overternal wounds. If on dissection any internal injury is found likely to have resulted from external violence, careful examination should be made—if this has not already been done—for signs of violence in the issues between the seat of injury and the surface of the body, and for marks of violence on the surface of the body over the seat of injury. Any unusual appearances found in addition to those already mentioned, should be recorded.

#### I -THE HEAD

The internal examination of the body should commence with dissection of this cavity -(a) in cases where the cause of death is doubtful and (b) when it is suspected that death has been due to head injury, or has occurred by coma

#### Procedure

- 1 Make an incision through the integuments from ear to ear over the vertex and reflect the scalp, one flap forwards, the other back wards
- 2. Saw through the shull by a circular cut at the level of about an meh above the orbits in front, and of the occipital protuberance behind, detaching the shull cap without using the chael Raise the skull cap from before back wards, separating the dura mater from it.
- 3 Divide and reflect the dora mater on either side. N B — It the dura mater is so firmly adherent to the skull cap as not to be easily separable, it should be divided care fully and removed with the skull cap

Appearances to be looked for and recorded

(a) Extra assitions of blood in or under the sculp, their situation and extent (b) Impures to the bones of the skull cap visible externally, viz separation of sutures, tractures, or indentations their situation, ex tent and direction (see 2 b, below)

(a) Unremal thanness of the skull boars (b) Complite 1 fs. alore, by examing, or complete 1 fs. alore, by examing, or (c) Lillness (or the reverse) of the long tudimal annu. (d) Condution of the membranes of the brain, cg amount of adhesson, if any, of the dura matter to the skull cap presence of congestion or rigns of the dura matter to the skull cap and the complete of the comp

#### Procedure

4 Remove the brain carefully, place it base downwards, and proceed to slice it horizontally from above

#### Appearances to be looked for and recorded

(a) Extra, asations at the base of the skull, their situation and extent (b) Volume of any scrous fluid found within the skull or ventricles of the brain (c) Weight, colour, and consistence of the brain (and in immature infants its contion of development, pp 282 f) (d) Apoplectic effusions within the substance of the brain, their situation of the brain, their situations of the contraction of the brain of the contraction of the brain of the contraction of the brain of the contraction of the conorther was from decays of the coxtof the cerebral atterns.

- 5 Strip off the dura mater from interior of the shull
- (a) Fractures of the base of lateral portions of the skull, their stituation extent, and direction, and thickness of the bones at the seat of the fracture (b) In infunts, presence of air in the cavity of the tympanum
- 6 Examine the upper portion of the spinal cord through the foramen magnum

If any signs of injury to the cord or upper cervical vertebraare found, proceed at once to IV returning subsequently to II

## II.—THF THORAX (including preliminary examination of the abdominal cavity)

The internal examination of the body should commence here, in cases where death appears to have been due to chest enjury, or to have occurred by asplying. Also when there is reason to believe that the cause of death is connected with the contents of the abdomen In this last case after II. 1 proceed to III. (see N.B. below)

- 1 Make a long messon from a little above the sternum down to the pubes, reflect the integriments on either side, laying open the abdominal cavity but not the cavity of the thorax. In infants take care to carry doe mession a little to the left of the umbilicus.
- (a) Position, colour, and general appearance of the exposed viscera (b) Presence of abnormal contents, eg blood, products of inflamma tion, or tumours (c) Determine with the hand (especially in new born infants) the position of the dia phragm, noting whether the upper level of this is between the fifth and sixth ribs (see Chap  $\lambda$ VI ), or higher NB—Should this pre liminary examination indicate, or there be reason to believe, that the cause of death is connected with the contents of the abdomen, pro ceed at once to III, subsequently returning to II 2

### Proceedure

- 2 Complete the reflection of the integuments over the thorax to a point beyond the junction of the earthques of the ribs
- 3 Divide the rib cartilages as far from the sterrom as possible, or, if these are ossible do ut through these are ossible do ut through the ribs a little outside the cartilages. Outling upwards, close under botting upwards, close under nib cartilages, raise the sterrom and cartilages. Do not cut through the sterronciaveniar joints as blood from the underlying large actions into the pleural cavity. When the cartilages have been cut foreigh draw the sterrom upwards till it fractures without injuring the parterups without injuring the parterups without injuring the parterups without injuring the parterups without injuring the parterups without injuring the parterups without injuring the parterups without injuring the parterups without injuring the parterup and the
  - 4 Open the pericardium
- 6 Willout removing the heart from the body open his earnies in the following order (i) It venticible. (2) It survice (3) It survice (4) It venticible in the segment of the heart beginning close to the base and ending short of the open (2) in the segment of the heart of the heart of the heart of the heart of the heart of the the segment of the vene cave, and ends just in front of the base (8) Engus at the left superior pul monary ven, and ends just in front of the base, short of the coronary ven (4) Begus belind to the segment of the coronary ven day legus belind to the segment of the next of the and short of the next of the segment of the next of the segment
- 6 Remove the lungs and heart together NB—In cases where it is suspected that death has been due to mury to the neck, and in cases where the condition of or presence of foreign matters in the

- Appearances to be looked for and recorded
- (a) Extravasations of blood or signs of bruising in the integui ments of the front of the chest, their situation, and extent (b). Fractures of the anterior portions of the ribs, their situation and the direction in which the fractured ends appear to have been driven (see also II. 9 c)
  - (a) Yoluma of the lungs, whether propering out of the sheet whether propering out of the sheet (indicating cample years), or extra panded and nearly covering the pencarilum, but not propering, to collapsed, exposing the pencardium (b) Colour of the lungs, in infants, whether dark red or bright red (c) I'llud un the pleural cavities, matries and volume (d) Adhesons of the lungs (e) Condition of the lungs (e) Condition of the button (f) Zumours in the thorum (f) The control of the lungs (f) Condition of
  - (a) Condition of the pericardium, nature and volume of any fluid pre sent therein (b) Sire, colour, and consistence of the heart and con dation of fullness of the coronary versaels
  - Note, as each cavity is opened, the amount and condition of its

(a) Presence on the surface of the lungs of Tardieu s spots, or patches of emphysems (see Strangulation and suffication) (b) In new born infants note if inflated air vesseles are visible on the surface of the

#### Procedure

gullet or air passages is likely to be of importance, proceed after 5 or 10, returning to 6 et seg afterwards

7 Separate the heart, and test the condition of the arterial open ings by pouring in water

- 8 Make long incisions into each lung, and, if necessary, follow the branches of the bronchial tubes and pulmonary artery by dividing them with seissors
- 9 Previous to opening the de scending aorta, the two ligatures round the esophagus near the diaphragm, divide the esophagus between them and dissect it out of the way
- 10 Prolong the measure upwards to the chin, reflect the skin as far back as possible, separate the soft parts from the made of the lower law, cutting close to the bone Pull the tongue forwards below the chin, and carry the dissection backwards, separating the pharynx and esophagus with the largnx and traches from the spine Open in succession the largnx, trachea, and cso phagus

#### Appearances to be looked for and recorded

lung and distinguish between these and bubbles of gas due to putrefaction (see pp 8.35, etc.), then proceed to the hydrostatic test noting while dividing the lungs whether they exude frothy blood freely and crepitate, or show signs of disease

- (a) Condition of the cardiac values tuffs of fibrin on their edges, at ce (b) Livil patches on the endocardium (see Arsens) (c) Condition of the heart tissue (f) In new born infants, condition of the foramen ovale (c) Condition of the portions of the large vessel remaining attached to the heart
- (a) General characters of the lung sixus (b) Disease of the lungs (c) Apoplectic effusions into the lung substance (see Strangulation) (d) Con lition of the bronchial tubes, nature and quantity of foreign matters present therein (see Drown ing) (c) Condition of the branches of the pulmonary artery, noting any obstruction
- (a) In newborn infants, note the condition of the ductus arteriosus (b) Examine the aortis for atheroma and aneurism (c) Complete the examination of the ribs for fractures
- (a) Foreign bodies, marks of cor roston etc, in the larynx trachea, and esophagus (b) Lxamine the large vessels of the neck for injury, obstruction etc, opening them carefully (c) Ascertain the condition of the cervical vertebre

#### III -THE ABDOMEN

In Infants the condition of the umbilical vessels, and of their continuations within the abdomen, should, so far as can be done without removal of any of the abdominal viscera, now be ascertained, completing the examination after the remaining portions become exposed by removal of the viscera

In all cases examine first generally, and without further dissection, the abdominal viscera in a fur. Should the examination show, or should there be reason to beheve, that the cause of death is connected with any particular organ, the further examination should commence with the organ or organs concerned. Thus in cases of poisoning the further examination should commence with the stomach and intestines. Each viscus should be carefully examined in situ previous to its removal for further examination, noting particularly any enlargement or unusual appearance and any wound or sign of injury. If a wound be present, its precise situation direction, and appearance should be described and it should be noted whether or not any blood is efficied in its neighbourhood. The general consistence of the injured viscus scholld also be noted. Each viscus is then to be removed, and, after removal, further examined as below

- 1 The Liver—Note its weight and appearance on section This may be (a) uniform dark brown = mormal, or (b) either uniform dark red the cut surface evinding blood preity freely, or of a nutmeg appearance it in some phreesdark red, in others buff or yellow = congestion, or (c) texture dense and tough, surface irregular = cirrhosis, or (d) in places soft pale yellow, and greasy = fatty, or (c) uniformly pale yellow, and reduced in size = yellow atrophy, or (f) enlarged and heavy, consistence doughy, cut surface greyish and glistening or somi translucent in appearance = amyland or lardaceous. Note presence of abscesses or tumours. Note also the condition of the gill-bladder, and the nature of its contents. If there be any reason to suspect death from poison priserve for analysis a large portion of the liver, at least one pound in weight
- 2 The Spleen—Note its size weight, and appearance on section. If death has been due to rupture of this organ, it is of special importance to note its consistence, and whether or not any signs of injury are present on the surface of the body over it, or in the issues lying between it and the surface of the body.
- 3 The Kidneys.—Note in regard to each its weight, and whether or not the capsule peels off readily Then, commoning at the convex border, make a long incision through it as far as the pelvis, and note if any signs of inflammation of the limits membrane be present. Note the condition of the cut surface

Congestion accompanied by softening and enlargement, or pallor similarly accompanied, indicate inflammation respectively in the early and later stage. Again, the capsule may be adherent, the viscus reduced in size, and its section granular or cystic = forms of chronic Brights disease, or the kidney may be enlarged, the cypsule non-adherent, and the section pale, waxy, smooth, and glistening = amyloid degeneration. Note the presence of morbid growths or tubercular deposit. In cases of poisoning preserve one or both kidneys for analysis

4. The Pelvic Organs—The two ligatures round the lower part of the larger intestine a little above the rectum and divide the gut between them Open the urinary bladder in situ and determine its contents, preserving any urine found for subsequent analysis. In male infants note the position of the testicles. Then, having examined each organ in situ, remove the whole of the pelvic organs together and complete the examination of the bladder ureters, and urethra, noting in males the size of the prostate and the condition of the testicles Examine the rectum, noting specially in infants the presence or absence of meconum.

## In Females, examine the generative organs as follows -

- (a) The vagana.—This is to be opened first and examined for marks of injury and presence of foreign bodies, preserving any matters found for analysis. Its colour, the presence or absence of ruge, and the condition of the hymen are also to be noted.
- (b) The uterus Measur. externally its length and greatest breadth Take its weight Then open it by an incision from fundus to cervir, and note the dimensions of its cavity and the thickness of its walls (see 'Abortion, p 315 ff') Note the nature of its contents if any, and it a fectus be present determine its age (see table, p 291) Record the condition and colour of the lining membrane and muscular substance, presence of internal injuries, or of morbid growths
  - (c) The ovaries—Note in regard to these their size and external appearance, and after section examine for signs of disease and for true and false corpora lutea (see p. 326)
  - 5 The Stomach—Before removing this viscus the two higatures round the duodentum close to the stomach, and divide the gut between these ligatures (If the abdominal cartit is dissected before the thorax, a similar procedure must, before removing the stomach, be adopted with the esophagus (see p 729,9)) In infants, before opening the stomach, note if any air appears to be contained in it (see p 337). Then pluce

the stomach in a clean jar or photographic developing dish and open it along it's lesser curvature, collecting its contents in the vessel. Note the volume of the fluid contained in the stomach, its general appearance, the character of any matters suspended in it, and any peculiar odour povessed by it. In infants, examine the contents of the stomach for the presence of milk, food, etc (see 'Infanticade', p 337') If there is any reason to suspect poisoning, preserve the contents of the stomach for analysis and note carefully the condition of the mucous membrane, and examine for the presence of adhering jarticles of poison. Any suspicious looking particles should be picked off with a pur of forceps and separately preserved for analysis.

6 The Intestines—These should be removed like the stomach, and after removal, should be laid open along their whole length, preserving, in cases of suspected personing, their contents for analysis, with precrutions similar to those observed in preserving the contents of the stomach. In the case of maints note if meconium be present, and its position. Note the condition of the nucous membrane, presence of any crosions, ulcers, or perforations, and the condition of the agministic and solitary clands.

NB-After completing the dissection of the abdomen, proceed to the dissection of the thorax, should this cavity not

have been already dissected (see p 728, 2)

## IV —THE SPINE AND SPINAL CORD

This should be examined in all cases where it is likely to have been injured or where symptoms of irritation or inflam mation have been present or tetanus or poisoning by strychnine, etc., suspected It should always be the final object examined, so that this rough operation may not injure or obscure the condition of other cavities and organs Procedure divide the integuments down to the bone by an incision in the middle line slong the whole length of the spinal column, reflect the integuments on either side and cut away the muscles from the arches of the vertebræ In carrying out this dissection, note any, extravasations, of the blood in the tissues over the some and any fracture of the bones which may be exposed. Then saw through the vertebral arches on either side and remove the detached portions of bone. Fxamine the outer surface of the exposed dury mater, then slit it open carefully along its whole length, and examine the exposed portion of the pis mater in situ Next pass the finger gently down the cord noting its consistence, then remove the cord from the body and complete its examination making for this purpose transverse incisions through it in several places. Finally remove the durn mater from the interior of the spinal canal and complete the examination of the vertebers for fractures.

#### V THE LAFE JOINT

In new born unfants this joint should be opened by a transverse incision in front the lower end of the femur pushed out through the wound and the cartilage at the end of the bone sliced trinsversely in fine slices until a pink spot appears in the cut surface, very fine slices are then to be made and the greatest drimeter of the bony nucleus ascertained (see pp 48 and 286)

[The instruments used in the post morten examination should after washing be sterilized by heat. This may be done by dipping the blade into benzine and then applying a light the flame being sufficient to sterilize the metal.]

#### WEIGHTS OF VISCEPA

The weights of the viscera should be ascertained if possible The table below shows the average weights of the chief viscera of a lult natives of Bengal and Bihar who have died in gaols of disease

1			7					
Organ	No of cases		Ave age weight.		Ilighest.		Lowest	
	Males,	Females.	Ma es.	Fema es	Males.	Females.	Males,	Females.
Laver Splecn Lung R L Hesrt Kidney R L Brain	333 314 224 274 236 246 246 246 143	88 91 49 49 46 68 68	07. 41 101 16 141 77 83	3 1 6 1 9 1 9 1 9 1 9 1 9 1 9 1 9 1 9 1 9	108 61 50 43 20 8 8	62 48 20 17 9 6 6	62. 18 1 5 5 4 9 2 83	oz 16 1 6 4 4 1 1 26

Average height 5 ft 3 in Average weight 110 lbs Based on 28 000 cases — I M G Oct 1897

 $^{1}$  Compiled by Major W J Buchanan and Captain MacMed Gaz June 1992

#### The average weight for Europeans is -

#### IN ADULT EUROPEANS (according to Tidy)

Organ.	Male	Female
Brain Lungs (together) Heart (usually about in inches $5 \times 3 + 2 $ ) Stomach Lungs Spleen Fancreas Andnews (together)	52. 49\\\ 45 9\\\ 4\\\ 50-00 5-7 2\\\\ 9\\\ 9	64. 44. 82. 82. 83. 84. A little less than 44. 45-55. 5-7. 24-34. 82.

In the female the brain and lungs are lighter than in makes by 5\frac{1}{2} and 13 oz. respectively

#### 17

## MEDICO LEGAL REPORT -FORM

The following documents should be sent to the Chemical Examiner in connection with medico legal cases of suspected crime

#### HUMAN POISONING

I Fatal Cases -By post -1 Post Mortem Peport (No 1)

Nore—Information on the following toxicologically important points should invariably be supplied—(a) date and hour of onset of symptoms, (b) date and hour of patient's death (c) in cases where the body has been exhumed the dates of burnal and of exhumation should be mentioned. In all cases the entire stomach and contents with portions of liver and Lidney should be sent. In datura cases portions of the small intestine should also be sent.

2 Statement of symptoms supplied by the police to the forwarding medical officer

3 Note of treatment if any, adopted in the case (by the medical officer, police, or patient's friends)

4 Police reports (not vernacular) sent with the case to the forwarding medical officer

5 Vature of the preservative used (Rectified spirits to be

used except in suspected alcohol, phosphorus, or carbolic acid cases  $\boldsymbol{j}$ 

6 The scal should, if possible, be a private one, and the same seal should be used throughout

Under the corer of the box containing the articles for analysis

Memo stating (a) deceased s name and (b) number and date of post mortem report

II Non-fatal Cases —By post,—Medico legal Form No II, laying stress on the following —

(a) Symptoms observed by the medical officer or reported by the police

(b) Note of treatment adopted (if any)

(c) Police reports (not vernacular) forwarded with the case to the forwarding medical officer

(d) Nature of the preservative if any, that has been used

Under the corer of the box containing the articles for analysis

Memo stating number and date of medico-legal form used
and name of case

#### ABORTION CASES

Fatal—Same as in fatal human poisoning cases, but, in addition, the uterus should invariably be sent along with any foreign bodies found in the genital tract

Non-fatal —Same as in non fatal human poisoning cases, but, in addition, care should be taken to forward any foreign bodies expelled or removed from the vagina or uterus

#### BLOOD CASES

In blood and semen cases particular care must be taken to forward the magistrate's certificate permitting the removal of exhibits for chemical examination along with the exhibits

1. Medico legal Form No II

2 Memo with name of case and number and date of medico-legal form used to be enclosed along with the articles for examination

3 The entire garment, etc, must be sent, and a label should be stitched (never gummed or pasted) to each separate article

4 Knives or other weapons should bear a label tied on to them, and the string should be sealed

#### SPACES CASES

1 2 and 3 As in blood cases

4 Care should be taken that the cloth be not folded at the stained portion. Tie stain should be kept quite flat. The stained places should be protected by a thin layer of cotton wool on each surface as pressure may suffice to crush the spermatozoa beyond the possibility of recognition under the microscone

5 Where possible slides should be prepared from vaginal

mucus etc. in cases of rape or unnatural offence

#### CATTLE CASES.

(Fatal and Non fatal.)

By post -1 Medico legal Form No II

2 A sample of the preservative used in the case (A saturated solution of common salt to be used for cattle cases )

Under the cover of the box containing the articles for analysis

Number and date of medico-legal form used and name of case.

NOTE I -In sur poisoning cases the nunctured portion should always be searched for the needle or its fragments or any other foreign substance Such articles should be packed separately

Note II -It is very amportant that portions of stomach and of liver be sent a all cases

## MISCELLANLOUS.

and probably teless state. The fluit should have free access to every part of the specimen which should in fact, almost float in the fluid so that no matter in what position the bottle may be placed the secra will always be covered by the fluid?

2. Under n circumstances should viscers from different cases be included in the same parcel.

3 If two or more examinations have to be made on the same occasion the medical officer should complete one and label and seal the riticles connected with it before commencing a second examinat in otherwise there is a risk of the viscera etc. of one case get ing mixed with those of another

4 In cases where the police send a closed parcel through a medical officer, and the latter has no occasion to open it in transmission, the parcel should be placed in a second cloth cover, and the memo referred to in the above instructions should be placed under this fresh cover. This procedure is necessary in order to prevent cases getting mixed up on receipt in the chemical examiner's office

5 The impression of the seal attached to forwarding letter should be protected on both sides by a thin layer of cotton-wool

to prevent the wax being powdered in transit

6 The labelling and numbering of articles should not be in the vernacular, but in English

20. B C M D

#### v

### HYPOSTASIS v. INJURY.

(Refer, p 81)

Bain Case - Hypostasis mistaken for Injury - This was a celebrated case in Calcutta High Court, 1903 A post mortem examination was made on the body of Lalsa, a coolie male, aged 30 by Dr. Chandler, B sc. Cautab, who had formerly acted as assistant pathologist to Guy s and the Evelina Hospitals He found the day after death all the dorsal and dependent surface of the body of a livid dusky colour in diamond shaned patches, bounded by white lines corresponding to the ropes of the chargou on which the body lay He considered these marks due to suggillation Internally he found disease of the mitral valves, the base of the left lung consolidated but containing two abscesses with thickened walls There was recent pleurisy of both sides He looked upon these evidences of disease as a satisfactory cause of death. He found no signs of

The body was then buried in a shallow damp grave Four days later the body was exhumed On the sixth day after death, a second autops, was performed by Lt. Col Borah, IMS, who reported that the body was decomposing that rigor mortis was present!!! that he found the abscesses of the lung to contain a thick, creamy, soap like substance (This portion of the lung has been preserved in formaline) That all cusps of the mitral valve were much thickened, the heart hypertrophied that the brain was decomposing and contained about half a drachm of reddish serum in " both third ventricles (sic), that the lateral fourth an i fifth ventricles were normal. The marks on the dorsum were in his opinion contusions due to blows with a stirrup leather. He was of opinion death was due to shock the result of prolonged beating with a stirrup leather. He was of opinion that double pleurisy, two abscesses in a consolidated patch of lung combined with mitral disease could not have caused death

He relied on the "colour of the serum in both third ventricles as satisfactory evidence of shock!

examination -

The accused was found guilty by the Sessions Court, but on appeal the High Court reversed the judgment It is hardly necessary to point out the absurdates of this post mortem

1 Duration of rigor mortis to the sixth day in a body that had been handled, cut open, buried, again handled, carried fifteen miles on

a charpoy in a damp tropical climate 2 The skill that must have been used to give innumerable bruises all

on the dorsom with a leather strap that never once couled round to the ventral surface

3. The value attached to the reddish scrum in "both third ventricles" of a decomposing brain, which apparently did not communicate with the other ventricles.

Needless to say the most expert pathologist is not justified in attributing death to shock except in the absence of physical signs of any other cause of death, combined with a reliable history of some recognized accident capable of giving rise to fatal shock.

#### VL.

#### EARLY FORMATION OF ADIPOCERE.

### (Refer, p 91)

By Arthur Powell, M.B., M.S., Professor of Medical Jurisprudence, Bombay University, in B.M.J. 1917.

In India several cases of early formation of adipocere have been recorded, especially by Coull Mackenzie (Ind. Med. Gaz., 1889) and Major Moir, 1 M s. (Idem., May., 1897)

The accuracy of these observations has been disputed by many Dr R. 5 Ashe recorded a case in which he sent some of the tissues

to the Chemical L. xaminer, who only reported " very partial saponification had taken place,' after four days' burial and some days in transit

I was myself somewhat sceptical of the accuracy of previous observations, and in my own experience of many thousand automies adipocere was

The following should, however, satisfy the most critical -

Yakub Hatham, health; male, aged 85, was assaulted and a heavy rock thrown on his back while lying at the bottom of a ditch. He died at 1 p m and was buried at 5 30 p m on 11th September, 1916, in the Mussalman Cennetery, Bombay. The soil was chiefly gravel and shille, almost at the sea level There was an exceptionally heavy rainfall before and during the period of his burial

His body was exhumed and I made an autopsy at 11 a.m., 15th September, 1916-three days twenty two hours after death

There was little smell considering the decomposed aspect of the body. The stomach had ruptured from decomposition The intestine was fairly well preserved. The spleen had become difficunt and lay like a quantity of soft soap in the perstancal cavity.

The heart, liver and kidneys were of a pale colour and felt soapy

and greasy. The pancreas looked and felt like soap, its outline well preserved

The muscles and tissues generally were partly turned into a soany substance which stuck to the hands On washing the hands without the

addition of soap, this substance formed a greasy lather Lumps of a soapy substance, weighing 210 grains altogether, were removed from the region of the cheeks and temples and submitted for

analysis to Major W H Dickinson, 1 u s , Professor of Chemistry in this University, Chemical Analyst to Government These lumps looked and felt exactly like pieces of Old Brown Windsor sonp

Parts of the substance shaken up in water formed frothy "suda" at surface Selected lumps almost completely dissolved in alcohol, leaving a small deposit at the bottom of the tube. No structure could be recognized with the microscope in this deposit except doubtful portions of small arteries

The supernatant alcoholic solution formed an opaque milky emulsion

on the addition of water

Major Dickinson reported "The substance sent is adipocere"

The dates given above are definite and were sworn to at the inquest. and at trials in the police court and in the High Court

#### ۱II

## SHALLOW DROWNING.

(Refer. p 234)

Case (a) -Drowning in Shallow Water - An ayah, aged 35, went to pripare a bath for a baby in a hot steaming bathroom Shortly after her mistress found her dead kneeling on the floor at the side of the small bath, with her head submerged in the water The lungs and air passages contained much water. She was very anamic and weak as a result of a miscarriage, and had doubtless fainted while leaning over the bath

Case (b) -The dead body of a young Hindu woman was found lying

on a stretcher in one of the principal streets of Bombay

On examining the body I found the clothes and hair dry and not disarranged Copious fine froth was exuding from the nose and mouth Internally the trachea, bronchi and lungs contained much froth and water When cut into the lungs dripped much water There was no evidence of tubercle or inflamination. The right lung weighed 27 or , the left 221 oz The body was still warm and rigor mortis had not set in when found The spleen weighed 17 oz and contained ring and crescent malarial parasites Heart and kidneys normal

There was no doubt she had been drowned, but the question to be solved was, Why were the body and clothes dry? Some hours later her relations claimed the body, and gave the history that she had been suffering from vointing and fever During the vomiting she had been given two bottles of soda water which caused her to choke and splutter As treatment for the choking more water was poured into her mouth while her head was held! This must have got into the air passages and

caused her death

The husband explained that he and two friends were carrying the body, but finding the weight too much for them he and one of the friends went to get help. In the meantime the police arrived and began to raise an outery which terrified the remaining friend so that he bolted

No poison of any kind could be found in the body

## VIII

#### HYMEN IN VIRGINITY AND DEFLORATION.

(Refer. p 270)

PRACTITIONERS often have the most vague conception of the hymen A common error is to mistake for it the thin margin of the fourchette The hymen or its remnants lies deeper than the fourthette and the labin It can be readily seen even in infants by placing them in the

lithotomy position and gently separating the labia.

It consists of a thin membranous disphragin seldom exceeding in thickness the franum of the tongue, surrounding an opening either central or excentric. In the latter case more commonly situated in the anterior than the posterior part of the membrane. When intact it is usually of a homogeneous colour, paler than the surrounding mucosa and free from visible blood vessels on its surface

Its appearance in each case depends on-

1 Its consistence

2 (a) The size (b) The situation.

(c) Number and

(d) Shape of its aperture

The opening is commonly central, circular or oval with its long axis antero posterio

Its margin is usually entire, but may have one or more notches, be creaste or even fimbriate in the virgin condition. In such cases the crenations are not nodular, and are of the same soft consistence as the

A common variety is a crescentic fold parallel with the fourthette. stretched across the posterior wall of the vaging its concavity looking

forward, the horns of the cresent becoming lost on the anterior or lateral walls In rare cases it may be imperforate. In a few cases the opening is double owing to the presence of a

transverse or longitudinal bridle

In other cases the openings may be numerous, producing the cribiform hymen.

In many cases the opening is irregular in shape, triradiate or notched in various ways These notches, unless the result of trauma or connec tion, do not produce cleatricial nodules on the margin of the opening

In consistence the hymen is usually thin—as thin as the margin of the framum lingue or even thinner, but it may be thick—even ficeby
In a recent case of alleged rape on a child 11 years old, the hymon

formed a thick, circular elastic ridge with smooth, rounded, entire margin

as thick as the web between her fingers, and, without stretching, admitted my index finger

As the alleged rape took place ten days previous to my examination, all zould say was that I found no evidence of penetration, but that penetration might well have taken place without producing any tear

The hymen after intercourse—When the aperture of the hymen is penetrated by the penis or other suitable foreign body its margins become form in one or more places. The edges of the tears heal by granulation, and for five or six days a raw or granulating surface may be sen. After the lapse of eight or ten days escatrization is complete. On each side of the tear small rounded nodules of scar tissue known as the caruncles remain.

The question, "Is the female examined a virgin?" is often put to the medical witness, and in few cases should be answer "les or No".

Apart from the finding of sperm tozoa and evidence of dwease or injury the answer should be either a description of the state of the hymen or "I found the conditions usual in suganty "I found conditions usual in females who have hi i intercourse or 'The conditions found gave no evidence of sexual intercourse but were such that intercourse may have taken place without learning any endence

If the hymen be thin and fairly tense and the opening small, it is

obvious no object as large as a penis can have penetrated

If, on the other hand the opening be large or the hymen be thick
and elastic, or loose and flaced it is impossible to say from a physical

examination that no penis has ever penetrated it

If there be a laceration of the hymen the medical witness should say

so, and add whether the lactration be recent or of old standing, \* e its

margins raw or cucatrived

In a recent case where another surgeon had examined the victim he stated in his evidence, 'The hymon was completely destroyed I found

a circular hymen with a single linear tear in its posterior quadrant.

The opinions given by medical witnesses are often vague when they might well be definite. They are more often emphatic in circumstances when they should have been expressed with reservation.

#### IX

## HANKIN'S TEST FOR SEMINAL STAINS

(Refer, p 300)

In the hot dry climate of Upper India, seminal stains occasionally become so altered that it is impossible to remove spermatozoa from the fabric for examination by ordinary methods. It occurred to me that, in such cases, by subjecting the fabric to the solvent action of portssum eyanide, it might be possible to render the spermatozoa capable of removal. It was found that they could not withstand the eyanide unless they had been previously hardened by boiling in a tannin

solution. The following are the details of the process. It must be un terstood that a less complicated procedure would

probably be preferable in a damper climate

(1) Cut out the suspected stains from the articles of clothing The cut-out pieces should be about a centimetre square In the case of dhoties the chances of success in detection are greatly increased if the supposed seminal stains have been marke ! I v the police at the time of taking off the garment

(2) Place the cut out stains in a test tube and label the latter

(3) Add sufficient acid tannin solution to cover the stains

This solution contains tannin 0.5 per cent, and sulphuric acid 02 per cent (4) Place the test tube in a small beaker of boiling water Keep it in the boiling water for exactly five minutes. In

timing the different stages of this test it is convenient to place a watch on the table and to make a mark on its glass with a

glass pencil

(5) Take the stains out of the test tube A piece of wire bent at the end to a small hook is convenient for the purpose If the liquid in the test tube remains transparent on cooling it may safely be concluded that the stams are not seminal If as is more usually the case the liquid becomes turlid on cooling the stains may either be seminal or due to some other kind of organic matter

(6) I lace the stains on a piece of clean filter paper, and gently press them with another piece of filter paper to remove superfluous moisture | Fresh and clean filter paper must always be used It is not advisable to keep a large piece of blotting

paper on the table and to use it for different articles

(7) Place the stains for half a minute in glycerine ammonia This solution contains glycerine a per cent, and strong ammonia solution 1 per cent The object of this treatment is to remove or neutralize the excess of tannin solution If this is not done the stained specimens will contain too much coloured background

(8) Remove the stains and put them on filter paper (9) Transfer the stains to a small glass dish containing acid

bichromate solution Leave them in this solution for five minutes This solution should contain one per thousand of potassium bichiomate and two per thousand of sulphuric acid This solution does not keep well especially at a high tempera ture Therefore, in the hot weather, it is advisable that it should be freshly made up. The action of the bicl romate solution is to make the spermatozoa stain deeply when they are afterwards treated with carbol fuchsin

- (10) Place the stains on filter paper till superfluous liquid drains off
- (11) Transfer the stains to a solution of 2 per cent potassium cranide The action of this solution is to loosen the spermatozoa. If the action continues too long the spermatozoa may be hay fazeth
- (12) Take out the stains after the lapse of three minutes Mon off the excess of cyanide solution with blotting paper Place the stains in a glass dish containing distilled water
- (13) Place each strin separately on a slide Mop off excess of water Hold the stained fabric at one end with a pair of forcers, and scrape the surface with a knife. Sufficient water should be left to form a drop in which the scrapings are suspended This drop is spread out on the slide This treatment does not readily break up the spermatozon If the heads are found separate from the tails this is because decomposition had commenced before the stain had dried
- (14) The slides immediately after proparation are dried preferably in a current of air while lying on the top of a water bath This rapid drying is convenient lut not in lispensable

(15) The films on the sliles are fixed by pouring over them a mixture of equal parts of alcohol an l other

(16) The films are stained by means of carbol fuchsin which is allowed to act for five minutes at air temperature. For this and the preceding stages it is convenient for several slides to be held at the same time in a special clip so that they can be treated together 1

(17) The slides are well washed with water They are then washed for a few seconds with rectified spirit. The spirit is immediately and rapidly mopped off with filter paper, and the slide is at once dried

(18) The slides are examined with a medium power lens (eq. 3 millimetres) The spermatozon should be readily visible both the heads and the tails being stained and as a rule stained deeply Particles seen in these specimens have every conceivable shape With sufficient care and sufficient use of the imagination particles may be found in any specimen that have

In staining the si des it is possible that the fingers may become stained. with carbol fuchsin These stains may be removed by the following met! od Take two has no one containing water made alkal ne with a few drops of ammonia and the other containing alcohol Place the sta ned fingers in these aumonia and no other containing already in Face the sea from pages in these we best and the containing already several times. The period of immersion in each liquid should be from five to ten seconds. After a few dip: the colour will be found to have passed out not the water! quad. D flusion current produced when the alcohol wetted finger is placed in the water probably play a part in removing the dyp. The same method may be used in removing catholic each from the skin

some resemblance in outline to spermatozoa. The only safe rule for a beginner is that a positive diagnosis must not be made unless several spermatozoa are found. Spermatozoa are not recognizable as such for medicolegal purposes unless the heads are found in contact with the tails. Owing to decomposition the tails may often be greatly reduced in length, and in many individuals broken off. Really, when not visible with a low power, spermatozoa may be found with the help of an oil immersion lens. But in all cases in which spermatozoa are only found with difficulty there should be great hesitation in

making a positive diagnosis The great majority of stains that are examined will fail to show spermatozon Spermatozoa are not likely to be detected in the following cases (1) In films in which there is no sign of strongly stuned organic matter for instance, in specimens consisting almost entirely of dust or sand (2) Spermatozoa are not likely to be found in preparations in which no epithelial scales are seen (3) Spermatozoa are usually not recognizable if very numerous bacteria are present Spermatozon, at temperatures that obtain in India, may readily be rendered unrecognizable by decomposition Decomposition for twentyfour hours is often more than sufficient to produce this change In cases of assault coming under Section 376 I PC, the man usually runs anay, thereby drying the stains on his dhoto, which therefore are protected from decomposition and remain recogniz-The woman's clothes on the other hand, are hable to be wrapped up and sent for examination before the stains have had a chance of drying. This may be one of the reasons why, in practice, it rarely happens that spermatozoa are detected on a woman's clothes The chance of detection of spermatozon would be greatly increased if stams could be dried, at air

temperature, as early as possible after their formation To search through ten to twenty slides for spermatozon is somewhat tedious work. In my experience it is best done in the early morning Later in the day, when the eye is tired, the process of recognition is less rapid and easy

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### LUNACY CERTIFICATE-FORMS

# Schedule Indian Lunacy Act. 1912 (IV of 1912)

(See section 96)

#### LORM 1

Allegation for Receition Order

(See sections 5 and 6)

In the matter of A B [1] residing at , by occupation son of a person alleged to be a lunatic

To Presidency Magistrate for

for District Magistrate of

or Sub divisional Magistrate of

or Magistrate specially empowered under Act IV The petition of C D [1], resuling at

occupation son of for sub-division of town of

in the district of ["] years of age 1 I am

2 I desire to obtain an order for the reception of \ B as a lunatic in the asylum of situate at [3]

8 I last san the said A B at [4] day of

on the

4 I am the [5] of the said \ B for if the petitioner is not a relative of the patient state

as follows I am not a relative of the said A B The reasons why this petition is not presented by a relative are as follows [State them ]

The circumstances under which this petition is presented by me are as follows [State them ]

[1] Full name caste and titles

[4] Enter the number of completed years. The petitioner must be at least eighteen or twenty one whichever is the age of majority under the law to which the petitioner is subject [2] Insert full description of the name and locality of the asylum or the

name address and description of the person in charge of the asylum

[1] A day within 14 days before the date of the presentation of the petition is requisite

[\*] Here state the relationship with the patient

746

5 The persons signing the medical certificate which accompany the petition are [1]

6 A statement of particulars relating to the said A. B accompanies this netition

7 [If that is the fact] An application for an inquire into the mental capacity of the said A B was made to the on the and a certified copy of the or ler made on the said petition is annexed hereto [Or if that is the fact ] No application for an inquiry into the mental capacity of the said

A. B has been made previous to this application

The netitioner therefore prays that a reception order may be made in accordance with the foregoing statement

(Sd.) C D

The statements contained or referred to in paragraph are true to my knowledge, the other statements are true to my information and belief (Sa) C D

Date 1

Statement of rarticulars

If an i of the particulars in this statement is not known the fact to be so at ited 1

The following is a statement of particulars relating to the "aid A B Name of patient at length

Sex and age.

belief.

Married, single or widowed

Previous occupation.

Caste and religious belief, as far as known.

Pesidence at or unmediately previous to the date hereof Names of any near relatives to the patient who are alive.

Whether this is first attack of lunacy

Age (d known) on first attack

When and where previously under care and treatment as a lunatic Duration of existing attack Supposed cause.

Whether the patient is subject to epilepsy

Whether suicidal. Whether the patient is known to be suffering from phthisis or any form of tubercular disease

Whether dangerous to others and in what way

Whether any near relative (stating the relationship) has been afflicted with insanity

Whether the patient is addicted to alcohol or the use of onium,

ganja, charas, bhang cocame or other intoxicant. The statements contained or referred to in paras. are true to my knowledge. The other statements are true to my information and

> (Signature by verson making the statement ]

[4] Here state whether either of the persons signing the medical certificates is a relative partner or assistant of the lunatic or of the petitioner and, if a relative of either, the exact relationship

#### FORM 8

### Medical Certificate

(See sections 18 10)

In the matter of A B of [1] in the town of the sub division of an alleged lunatic [1]

I the undersigned C D, do hereby certify as follows

I I am a holer of [1] or me lical partitioner declared by Covernment to be medical order unter act I'v of 191"] and I am in the nettinal practice of these under Act I'v of 191"] and I am in the nettinal practice of the medical covernment.

2 On the day of \* 19 at [3] in the town of

or the sub division of in the district of

separately from any other practitioner [4] I personally examined the said A B and came to the conclusion that the said A.B is a lunatic and a proper person to be taken charge of and detained under care and treatment

3 I formed this conclusion on the following grounds viz --

(a) Facts indicating insanity observed by myself, vi -

(b) Other facts (if any) in liceting insanity communicated to me by others, viz —Here state the information and from whom

> (Sd) C D (Designation as above)

[1] Insert residence of patient
[7] Insert qualification to practise medicine and surgery registrable in the

[\*] Insert qualification to pract United Kingdom

[7] Insert place of examination [4] Omit this where only one certificate is required

### ХI

# LIFE ASSURANCE IN INDIA.

In a relatively recent note on 'Mortality and Life Assurance in India' read before the Institute of Actuaries in 1909 (Proc. D 8), Mr A T Winter, FIA, writes

"Amongst European lives the mortality is nearly as high in the first five years of assurance as in subsequent years,' and then again, "during the first few years of residence in India, Europeans are more likely to become victims to enterior fever and similar diseases than subsequently, and as assurances are frequently effected when a man goes out of the country, this period of acclimatization is often concurrent with the first five years of assurance. This I think explains to a large extent the heavy mortality of Europeans during that period. And on page 26, he writes. The effect of selection on European mortality in India is not apparent the mortality rates of the first five years of assurance being approximately, the same as those ruling for lives of the same age which have been found insured for longer periods. This may, perhaps be accounted for by the fact that the trying period of acclimatization is frequently concurrent with the first five years of assurance

"The most eligible class of natives are assurable at the same rates as Luropeans in India provided their a.e entry does not

exceed forty

Concealments of Material Facts in Life Assurance (See p. 431)

Case (1)-J A. R. insured in 1910 stated in reply to a written question that he never had syphilis. He died suddenly aged 39, from cerebral hamorrhage in 1915. It transpired that he had contracted syphilis in 1907 and underwent over a year's treatment. At first the company refused to pay but subsequently compounded for a small sum. Cuse (2)-Norwich Union and G In 1913 the life of & was assured for Rs 80,000 A fortnight later he was found impaled on some railings outside the house of a man interested in the Assurance. He had obviously either fallen jumped or been thrown out of a second story win low At the autopsy I recognized him as a man who had been examined by me with a view to assurance a month previously I had rejected him as I found advanced tuberculosis of the upper lobe of the right lung a suspicious condit on of the left apex and some suppurating tubercular glands in the neck. I informed him and his friends of his condition, and advised them that it was impossible to get assured in any company. Nevertheless he got assured by the Norwich Union a fortnight later, concealing the fact that he had tul erculoses and stating falsely that he had never been examined previously with a view to assurance I communicated these facts in writing to the Company the Coroner and to the Police, and requested the autopsy should be made by an inde per lent pathologist. This pathologist found the conditions I had indicated, by t much more advanced in the left lung thu I had found a month previously All claim on the Norwich Union was withdrawn -Professor A Powell's Notes 1917

### XII

## POISONING AND ANTIDOTES, SUMMARY.

Diagnosis.—For diagnosis of the particular kind of poison taken the following suggestive list is abstracted from Marrell's admirable handbook "What to do in Cases of Poisoning"

1 You will find the patient dead —Prussic Acid Cyanide of Potassium, Strong Ammonia Carbonic Acid Gas Carbonic Oxide, Oxalic Acid and other active poisons given in a large dose

- 2 Patient is comatose,-Opium and Morphine Alcohol Chloral, Chloroform, Camphor
- 3 Is collapsed .- Strong Acids, Alkalis, Aconite Antimony, Arsenic, Tobacco, Antipyrin, Antifebrin and last stage of most poisons
- Is cyanozed -- Aniline, Antifebrin
- 5 Is delirious. Cannabis Indica, Datura, Belladonna (noisy), Hyoscyami Alcohol, Camphor
- 6 Is tetanized .- Nux Vomica and Strychnine, Arsenic. Antimony, excessive pain also approaches this condition
- 7 Is paralysed .- Aconite, Arsenic Lead, Conium
- 8 Pupils dilated .- Dafura, Belladonna and Hyoscyamus, in early stage, Opium and Aconite in last stage Chloroform, Alcohol.
- 9 Pupils contracted -Opium Physostigmine Chloral
- 10 Skin is dry.-Datura Belladonnu, Hyoseyamus
- 11 Skin is moist. Opium, Aconite, Antimony, Alcohol, Tobacco and other poisons in state of collapse.
- 12. Mouth is bleached .- Carbolic Acid Corrosive Sublimate and Caustic Acids and Alkalis
- 13 Is vomiting .- Arsenic (Brown with Blood), Antimony (White) Digitalis (Green), Aconite, Ammonia Phosphorus, etc.

### Antidotes for Commoner Poisons.

#### Abbreviations

SP = Stomach pump

\_\_\_\_

E = Emetic, preferably apomorphine 10 gr, or common salt or mustard at once followed by bitter emetic ipecacuanha zinc sulphate, etc

D = Demulcents, milk white of egg, barley water, olive oil. 1 to 1 of water, flour paste

St = Stimulants, eq brandy, ether, sal-volutile, hot water

	Poiscos.	Creatment and antid sea.	
1	Mineral acids	Do not use SP or E but neutralize by alkalia- eg chalk scrapings from whitewashed wall mortar soda sosp and water, or UA Then D	
_	Oxal e acid	Opium or morphine 1 gr for pain and shock Do not use SP or L, but give lime followed by caster oil	
	Carbone acid	Wash out stomach till washing cease to smell. Then fill stomach with solution sulphate magnetia ‡ oz to pint D and St Artificial respiration if neces- sary	
	Hydroryanic acid and cyanides	In open air cold douche dashed over head and neck from height SP or F Sulphata of iron and liquor perchloride of iron St and other hypo- dermically	
Alkalies	Caustic alkalies	Do not use SP or E but neutralize by dilute acids vinegar lime juice Then D and for pain morphise sulphate i gr	
	Arsenia	SP or F Complete removal of contents is im	
		DA or ferric hydrate or dislyred from in frequently repeated tablespoonfuls, followed by a little sal- in water as emotic	
1		D and St. Ice for thirst During recovery, mor	
Fig.	Antimony salts	Phine 3 gr Its own emotic 31 not SP or E Strong tea or other tannin rejeated	
Metallic salts	Mercuric chloride	D St and for pain morphine Do not empty stomach till give white of egg mixed with milk and water	
Zet	Ì	Then SP or E to get rid of precipitate UA   Tincture of opinin for pain or purging St i depression	
	Col bea	If no vomiting egg and milk before emptying stomach	
	Land	D and oppum SP or E Sulphates of magnesia or soda or dilut	

<sup>1</sup> The Universal Antidote of Murrell is (a) Saturated solution of Ferrons subplace 100 parts (b) Galanced Magnessa 38 parts (Charcell 30, Water 100 Mile shows two solutions at the moment of using Minrell states that it is a perfect antidot for Arterica Lion and Digitals and Aerds useful for Mercury, Vorpiline and Strychune but of no use for Alkalis Lead Antimony or Hivinevania between the Minrell Strychune 100 parts of the Minrell Strychune 100 parts of the Minrell Strychune 100 parts of the Minrell Strychune 100 parts of the Minrell Strychune 100 parts of the Minrell Strychune 100 parts of the Minrell Mi

Polsons,		Treatment and Antidotes
	Opum and mor phine	SP or in mild cases E Hot coffee Potassium permangianate (teo p 465) by mouth and for washing storanch or charcoal UA e-pecially for morphine Rouse and dash cold water on face Warm extremities Artificial repriaration for some hours if necessary, and
Organio Potsons	Aconite	strychnine 3 gr or liquor 5 mins, and atropine (50 gr) hypodermically SP or L Digitalis (20 mins) or digitalin 100 gr hypoderm cally
	Datura	St and warmth to extremities position trithicial respiration and friction Strychnine dogr SI or E (Agr.) or pilocarpine (Agr.)
	Strychnine and nux vomica	St and hot coffee Artificial respiration SP or F Potassium bromide 2 drams UA or tannin 30 grs indine tincture 1 dram in water followed by E or Si
	Digitalis Alcohol (acute)	Chloroform inhilation in convulsions Artificial respiration SP or F UA taining or strong tea or coffee St and warmth Recumbent position and aconite Annionium carbonate 50 grs in water SP or E
	Chloral and chloro- form Aniline derivatives	Rouse by cold affusion lattery hot coffee trithcial respiration Warmith to extremities SP or F Strychnine warmith friction and hot coffee. St ether hypodermically Artificial respiration F St Warm extremities Recumbent position
	antipyrine anti febrin, phenace tin, pyrognilol Cocaine Croton oil	Strychnine 2 gr Artificial respiration  EP St and inhale ammonia smyl nitrite Morphine Artificial respiration SP or I Wash out stomach with milk or sweet oil and water D St Optum or morphine for pain
	Fungi and food, poisonous	

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